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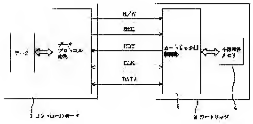
(54) **RECORDING DEVICE**

(57)Abstract:

PURPOSE: To improve the recording grade by providing various kinds of recording information such as the kind of cartridges, the remaining amount of a recording component and the recorded grade and sensing them securely.

CONSTITUTION: A cartridge 2 for storing a recording component is provided with a nonvolatile memory 4. The recording component stored in the cartridge 2 is fed to a recording head not indicated in the drawing through a feed pipe not indicated in the drawing. The nonvolatile memory 4 is connected with a control board 1 of a recording device main body through a cartridge side control section 4 by means of a plurality of signal lines. The optional information such as the kind of the cartridges 2 and the remaining amount of the recording component can be written in the cartridge 2, and the information written in the cartridge 2 can be read out on the recording device main body by the arrangement.



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CLAIMS

[Claim(s)]

[Claim 1] The recording head which the member for record is made to adhere to recorded media, and records on said recorded media, In the recording device which records on the body of a recording device using the member hold container for record prepared free [attachment and detachment] while holding said member for record supplied to said recording head When said body of a recording device is equipped with said member hold container for record The recording device characterized by having a control means for carrying out read-out and the writing of said information to a storage means formed in said member hold container for record to memorize the information on arbitration temporarily or everlastingly.

[Claim 2] the number of alphabetic characters recorded in the recording device which records using the recording head which make the member for record adhere to recorded media, and records an alphabetic character on said recorded media, and the record member hold container which hold said member for record supplied to said recording head -- counting -- carrying out -- said counting -- counting which offers the residue information on the member for record in said member hold container for record based on a result -- the recording device characterized by to have a means.

[Claim 3] the number of dots recorded in the recording device which records using the recording head which make the member for record adhere to recorded media, and records on said recorded media, and the record member hold container which hold said member for record supplied to said recording head -- counting -- carrying out -- said counting -- counting which offers the residue information on the member for record in said member hold container for record based on a result -- the recording device characterized by to have a means.

[Claim 4] The recording head in which the delivery for carrying out the regurgitation of the ink towards recorded media was established, It records using the ink hold container which holds the ink supplied to said recording head. In the recording device which records on said recorded media by generating an image pattern based on the image formation data inputted from the information generation source, and carrying out the regurgitation of the ink from said delivery according to said image pattern counting which carries out counting of the number of record dots for said every recorded media based on said image pattern -- with a means A calculation means to compute the amount of ink use schedules from said number of record dots by which counting was carried out, An amount detection means of ink to detect the amount of ink in said ink hold container, and the amount of ink use schedules computed by said calculation means, A decision means to measure the ink consumption actually used for the record which might be based on the amount of ink detected by said amount detection means of ink, and to judge the existence of the abnormalities of a record image, and when it is judged that abnormalities are in said record

image The recording device characterized by having an information means to tell a user about the abnormalities of said record image.
[Claim 5] The recording head in which the delivery for carrying out the regurgitation of the ink towards recorded media was established, It records using the ink hold container which holds the ink supplied to said recording head. In the recording device which records on said recorded media by generating an image pattern based on the image formation data inputted from the information generation source, and carrying out the regurgitation of the ink from said delivery according to said image pattern counting which carries out counting of the number of record dots for said every recorded media based on said image pattern -- with a means A calculation means to compute the amount of ink use schedules from said number of record dots by which counting was carried out, An amount detection means of ink to detect the amount of ink in said ink hold container, and the amount of ink use schedules computed by said calculation means, A maintenance means to calculate a difference with the ink consumption actually used for the record which might be based on the amount of ink detected by said amount detection means of ink, and to hold the value, The existence of the abnormalities of a record image is judged by the comparison with a recovery means to perform recovery for maintaining said recording head at clarification, and said amount of ink use schedules and said ink consumption. In being abnormal, after operating said recovery means, the effectiveness of the recovery by said recovery means is judged from the difference of the amount of ink use schedules and ink consumption which were held at said maintenance means. The recording device characterized by having a decision means to perform image recording again when it is judged that it is effective.
[Claim 6] claim 1 equipped with the electric thermal-conversion object for a recording head to generate the heat energy for ink regurgitation thru/or any 1 term of 5 -- alike -- the recording device of a publication.
[Claim 7] A recording head is a recording device according to claim 6 which makes ink breathe out from a delivery with the heat energy impressed with an electric thermal-conversion object using the change of state produced in ink.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the recording device which records by making members for record, such as ink and a toner, adhere to recorded media.
[0002]
[Description of the Prior Art] Conventionally, if the member stowage container for record (henceforth a "cartridge") which contains members for record, such as ink for recording on recorded media in a recording device and a toner, is prepared in the body of a recording device free [attachment and detachment] and the member for record is lost with record, what exchanges a cartridge for a new thing is known well. There are various classes of cartridges and it is necessary to change control of the body of a recording device according to the class of cartridge with which it is equipped in that case. Then, this was realized by a class, a property, etc. of a cartridge changing the appearance configuration of a cartridge for every class of cartridge as a means to offer the information on a cartridge proper to the body of a recording apparatus, and making the microswitch formed in the body of a recording apparatus by equipping the body of a recording apparatus with a cartridge push.
[0003] Moreover, offering the residue information on the member for record in a cartridge was

also performed by forming a level sensor in a cartridge and outputting the information from this level sensor to the body of a recording apparatus.
[0004] In the ink jet recording device which records on recorded media by carrying out the regurgitation of the ink from a delivery on the other hand, it originates in the blinding of a delivery, the short supply of the ink to a delivery, etc., and, partially or on the whole, ink may not no longer be breathed out. Then, in the usual ink jet recording device, the recovery device for maintaining a delivery and its circumference at clarification etc. was formed, and when the fault mentioned above occurred, recovery by said recovery device etc. was performed.
[0005]
[Problem(s) to be Solved by the Invention] However, in the thing which was mentioned above and which changes the configuration of a cartridge for every class of cartridge, it was difficult to offer much information. Moreover, since the informational contents are decided by the configuration of a cartridge and only lasting information can be offered For example, since information on new arbitration, such as a residue of the member for record in the member hold container for record, cannot be given, either It records, although there are few residues of the member for record, and the member for record is lost in the middle of record. Record grace falls or Although it thought that there were few residues of the member for record and the member hold container for record was exchanged for the new thing, it in fact still remains so much, and there was a trouble that the futility of a resource will arise. Furthermore, there was also a trouble that only the same information can be given also when a cartridge is reused, and versatility could not be given.
[0006] Moreover, in what formed the level sensor in the cartridge, the measurement result by the level sensor is ambiguous, and a different value for every measurement will not be detected, or unless it is in the condition which moreover stood it still on the function in the level location, exact measurement will not be able to be performed, but uncertain information will be offered. Consequently, although the member hold container for record was exchanged for the new thing since it detected when it was still so much, although there were few residues of the member for record, the member for record was lost in the middle of record, or it was detected when there was little remainder of the member for record There was a possibility that the case where it in fact still remains so much might occur, and there was a trouble that deterioration of record grace and the futility of a resource may arise.
[0007] On the other hand, in the ink jet recording device, the information about the poor regurgitation of the ink which originates insufficient [supply of the blinding of a delivery or the ink to a delivery] was undetectable, and since the user had looked at and judged the actually outputted record object, it had a trouble as shown below.
[0008] (1) When the blinding of a delivery is slight, since the fault by that appears in some recorded images, it may not be found only by glancing at the recorded image.
[0009] (2) In a color picture recording device, when it differs from the color specified by the recorded color, it cannot immediately judge in the thing which are the abnormalities of a recording device about whether color specification was mistaken.
[0010] (3) When performing record of two or more sheets continuously especially, even if the poor regurgitation of ink occurs in the middle of record, if a user does not notice it, record is performed to the last and a lot of recorded media as the result may become useless.
[0011] A residue, record grace, etc. of the class of cartridge or the member for record have various information about record, and the purpose of this invention raises record grace by detecting it certainly, and is to offer the recording device which does not consume a resource vainly further.
[0012]

[Means for Solving the Problem] The recording head which this invention makes the member for record adhere to recorded media, and records on said recorded media in order to attain the above-mentioned purpose, In the recording device which records on the body of a recording device using the member hold container for record prepared free [attachment and detachment] while holding said member for record supplied to said recording head When said body of a recording device is equipped with said member hold container for record, it is characterized by having a control means for carrying out read-out and the writing of said information to a storage means formed in said member hold container for record to memorize the information on arbitration temporarily or everlastingly.

[0013] Moreover, it sets to the recording device which records using the recording head which the member for record is made to adhere to recorded media, and records an alphabetic character on said recorded media, and the record member hold container which holds said member for record supplied to said recording head. the recorded number of alphabetic characters -- counting -- carrying out -- said counting -- counting which offers the residue information on the member for record in said member hold container for record based on a result -- what is characterized by having a means -- In the recording device which records using the recording head which the member for record is made to adhere to recorded media, and records on said recorded media, and the record member hold container which holds said member for record supplied to said recording head the recorded number of dots -- counting -- carrying out -- said counting -- counting which offers the residue information on the member for record in said member hold container for record based on a result -- it may be characterized by having a means.

[0014] Furthermore, the recording head in which the delivery for carrying out the regurgitation of the ink towards recorded media was established, It records using the ink hold container which holds the ink supplied to said recording head. In the recording device which records on said recorded media by generating an image pattern based on the image formation data inputted from the information generation source, and carrying out the regurgitation of the ink from said delivery according to said image pattern counting which carries out counting of the number of record dots for said every recorded media based on said image pattern -- with a means A calculation means to compute the amount of ink use schedules from said number of record dots by which counting was carried out, An amount detection means of ink to detect the amount of ink in said ink hold container, and the amount of ink use schedules computed by said calculation means, A decision means to measure the ink consumption actually used for the record which might be based on the amount of ink detected by said amount detection means of ink, and to judge the existence of the abnormalities of a record image, and when it is judged that abnormalities are in said record image what has an information means to tell a user about the abnormalities of said record image, and counting which carries out counting of the number of record dots for said every recorded media based on said image pattern -- with a means A calculation means to compute the amount of ink use schedules from said number of record dots by which counting was carried out, An amount detection means of ink to detect the amount of ink in said ink hold container, and the amount of ink use schedules computed by said calculation means, A maintenance means to calculate a difference with the ink consumption actually used for the record which might be based on the amount of ink detected by said amount detection means of ink, and to hold the value, The existence of the abnormalities of a record image is judged by the comparison with a recovery means to perform recovery for maintaining said recording head at clarification, and said amount of ink use schedules and said ink consumption. When abnormal, after operating said recovery means, when it judges the effectiveness of the recovery by said recovery means from the difference of the amount of ink use schedules and ink consumption which were held at said maintenance means and it is judged that it is effective, you

may have a decision means to perform image recording again.
[0015] And the recording head may be equipped with the electric thermal-conversion object for generating the heat energy for ink regurgitation in each invention mentioned above, and a recording head may make ink breathe out from a delivery further with the heat energy impressed with an electric thermal-conversion object using the change of state produced in ink.
[0016]
[Function] In invention according to claim 1 constituted as above-mentioned, the member hold container for record has a storage means to memorize the information on arbitration temporarily or everlastingly, and the information about the member hold container for record is memorized by this storage means. Being able to give the information on arbitration by this, to the member hold container for record, even if it does not change the configuration of the member hold container for record, moreover, this amount of information will become [many] as compared with the case where the configuration of the member hold container for record is changed. Moreover, the versatility of the member hold container for record also increases by rewriting the contents of the information memorized by the storage means.
[0017] the number of alphabetic characters recorded in invention according to claim 2 -- counting -- carrying out -- said counting -- counting which offers the residue information on the member for record in said member hold container for record based on a result -- if the amount of the member for record used per character calculates statistically beforehand, the amount of the member for record used consumed by record will be calculated by carrying out counting of the number of record alphabetic characters by having a means. Since the amount (initial value) of the member for record held in the member hold container for record in the intact condition on the other hand is also known beforehand, the residue information on the member for record in the member hold container for record is acquired by measuring said initial value and said amount used.
[0018] Also in invention according to claim 3, the residue information on the member for record in the member hold container for record is acquired by carrying out counting of the recorded number of dots like invention according to claim 2 based on it.
[0019] In invention according to claim 4, if an image pattern is generated from image formation data, while the amount of ink use schedules will be computed based on the image pattern by the calculation means, the amount of ink in an ink hold container is detected by the amount detection means of ink. On the other hand, after image recording is completed, the amount of ink in an ink hold container is again detected by the amount detection means of ink, and the amount of ink actually used for record by subtracting the amount of ink after record from the amount of ink before record is calculated. And a decision means compares the amount of ink use schedules, and the amount of ink actually used for record. In below the value to which the value of the amount of ink actually used for record subtracted the correction value in consideration of dispersion in ink discharge quantity etc. from the amount of ink use schedules It judges that ink is normally breathed out by neither the blinding of a delivery, nor the short supply of the ink to a delivery, and it is displayed on an information means that ink is not breathed out normally. Thereby, even if a user does not judge the record situation of recorded media visually, the information on the existence of abnormalities is offered by the recording device, and overlooking of a user of the record grace of the recorded media with which record was performed is also lost.
[0020]
[Example] Next, the example of this invention is explained with reference to a drawing.
[0021] (The 1st example) Drawing 1 is the important section outline block diagram of the 1st example of the recording apparatus of this invention. As shown in drawing 1 , it has the hold section (un-illustrating) which holds the ink which is a member for record, and a toner, the

nonvolatile memory 4 as a storage means, and the cartridge side control section 3 for controlling R/W of the information on nonvolatile memory 4 in the cartridge 2 as a member hold container for record, and the cartridge 2 is formed in it free [attachment and detachment] to the body of a recording device. Nonvolatile memory 4 is the memory of a serial data I/O mold, and the storage capacity is 128 bits. The cartridge side control section 3 and the control board 1 of the body of a recording apparatus are connected [each other] with each signal line of R/W, and REQ, DRY, CLC and DATA, when the body of a recording apparatus is equipped with a cartridge 2. From now on, the control means for carrying out informational read-out and informational writing to a storage means will be constituted by the control board 1 and the cartridge side control section 3 so that clearly. Moreover, in any case, although the body of a recording apparatus may be equipped with the recording head (un-illustrating) for making ink or a toner adhere to recorded media and it is prepared in the cartridge 2 in one, the ink or the toner of said hold circles has composition supplied to said recording head through a communication trunk (un-illustrating).
[0022] Drawing 2 is the timing chart which showed the lead of data, and the light process, and (B of (A) of this drawing) of the timing chart of a light process and this drawing is the timing chart of a lead process. By drawing 2 , signs that it transmitted 1 bit of data at a time were shown, taking a synchronization with each signal line mentioned above. The conditions of each timing shown in drawing 2 are set in a light process. Moreover, tw0<tw1<tw2<tw3<tw4<tw5<tw6 and tw1**tw1', tw6**tw6 -- '**tw6" -- it is -- moreover, a lead process -- setting -- tr0<tr1 -- < -- tr2<tr3 -- < -- tr4<tr5 -- < -- tr6, tr2=tr2', and tr5=tr5 -- ' it is .
[0023] Next, the write-in procedure of the data to nonvolatile memory 4 (refer to drawing 1) is explained with reference to drawing 2 and drawing 3 . Although the latency time between each step is omitted here, proper time amount shall be established with the property of the device to be used, and the actuation shall be guaranteed.
[0024] First, R/W is reset (S301). Next, it writes in DATA Rhine, data are put, and REQ is set (S302). And it judges that the cartridge side control circuit 3 (refer to drawing 1) returns RDY (S303), and if DRY is not then set, after judging with a fault and telling that, it ends. if RDY is set -- CLK -- a set (S304) -- CLK is reset further (S305) and data are transmitted. After receiving this set of CLK, and reset, the cartridge side control circuit 3 resets RDY. And reset of RDY is checked (S306), if RDY is not reset, it judges with a fault, and that is told and it ends. If RDY is reset, it will end normally and the information on arbitration, such as ink of hold circles of the product partition of a cartridge 2, or a part number and a cartridge 2 or a residue of a toner, will be written in nonvolatile memory 4 (refer to drawing 1).
[0025] Next, the read-out procedure of the data from nonvolatile memory is explained with reference to drawing 2 and drawing 3 . Like the case of drawing 3 , the proper latency time shall be established between each step, and the actuation shall be guaranteed also here.
[0026] First, R/W is set (S401). Next, REQ is set (S402). Since RDY will be returned by the cartridge side control circuit 3 (refer to drawing 1) if REQ is set, it is checked whether RDY has been set (S403). If RDY is not set here, it judges with a fault, and that is told and it ends. If RDY is set, the data which reset a set (S404) and CLK (S405), and are written in nonvolatile memory 4 (refer to drawing 1) in CLK will be read. And whether RDY is reset checks (S406), if set, it judges with a fault, and that is told and it ends. If RDY is reset, it will end normally.
[0027] As explained above, while being able to give more information, such as a class, a property, etc. of a cartridge 2, to a cartridge 2 by forming nonvolatile memory 4 in a cartridge 2, and forming the control board 1 for writing information to this nonvolatile memory 4 further, and the cartridge side control section 2, rewriting of this information can also be performed freely and the versatility of a cartridge 2 increases. Here, the ink in a cartridge 2 or the residue of a toner can also be known by making nonvolatile memory 4 memorize the number of record dots

at any time. Moreover, in order to identify the class of cartridge 2, since it becomes unnecessary to change the configuration of a cartridge 2 for every class of cartridge 2, the configuration of a cartridge 2 can be unified into one, as a result low cost-ization of a cartridge 2 is attained. Furthermore, since the information in a cartridge 2 is freely rewritten even when it is recycled after a cartridge's 2 using it, playback of a cartridge 2 becomes easy.

[0028] (The 2nd example) Drawing 5 is the outline block diagram of the 2nd example of the recording apparatus of this invention. The recording device of this example For example, the interface 11 which is a recording device like a list printer which mainly performs only printing of an alphabetic character, and receives printing data, The ROM component 13 in which a program required for CPU12 and CPU12 which control the whole recording device to process is stored, The RAM component 14 which offers the work storage which CPU12 needs, and the font ROM component 15 which stores a character font, The printing section 16 equipped with the recording head (un-illustrating) which prints an alphabetic character, and the nonvolatile memory 17 for memorizing the number of printing characters etc. are connected to recorded media with the data bus, respectively. Number count area of alphabetic characters 14a which is a momentary work area for carrying out counting of the number of printing characters is secured to the RAM component 14, and the number of printing characters by which counting was carried out by number count area of alphabetic characters 14a is memorized by nonvolatile memory 17 at every printing. Moreover, whenever the body of a recording apparatus is equipped with the cartridge (un-illustrating) as a member hold container for record with which nonvolatile memory 17 is formed in the body of a recording apparatus free [attachment and detachment], the contents of storage are cleared. namely, the number of alphabetic characters which the number of accumulation printing characters from the time of the body of a recording device being equipped with a cartridge was memorized by nonvolatile memory 17, and was recorded on it by the RAM component 14 and nonvolatile memory 17 -- counting -- carrying out -- counting -- counting which offers the residue information on the member for record in the member hold container for record based on a result -- a means is constituted.

[0029] The amount of the ink as a member for record held in said cartridge when said cartridge is intact here FV [cm3], Moreover, if the average ink consumption per single character is calculated statistically beforehand and the value is set to valve flow coefficient [cm3 / alphabetic character] Since a several n printing character is proportional to ink consumption, a several n printing character to consume the ink in said cartridge completely is given by n=FV/valve flow coefficient [an alphabetic character]. Let the value N which omitted the value of this n below in decimal point be the default value N for emitting warning of an ink piece.

[0030] Next, it explains, referring to the flow chart shown in drawing 6 about actuation of this recording apparatus. First, if a power source is supplied to a recording device, initialization processing of the recording device itself will be performed (S601). At this time, number count area of alphabetic characters 4a is cleared, and that value serves as zero. Next, it will be in a standby condition until it receives printing character data (S602, S603). Reception of printing character data analyzes the received data (S604). And delivery and printing are performed for the analyzed data in the printing section 16 (S605). Whenever it carries out single-character printing at this time, number count area of alphabetic characters 14a is incremented. If all printing of data is completed, the value currently recorded on nonvolatile memory 17 will be read. When the number of printing characters performed to last time is memorized by nonvolatile memory 17 by this cartridge and it prints by this cartridge for the first time this time, the value memorized by nonvolatile memory 17 is zero. By adding the value of number count area of alphabetic characters 14a to this value, and recording on nonvolatile memory 17 again, the accumulating totals of the number of printing characters are counted (S606). Next, number count area of

alphabetic characters 14a is cleared (S607), and the value is made into zero. And the number of accumulating-totals printing characters called for by S606 is compared with the value of the default value N mentioned above (S608), and it judges whether it is an ink piece. Namely, when the number of accumulating-totals printing characters exceeds default value N, after judging it as an ink piece and performing ink piece warning (S609), it will be in the standby condition of data again. When the accumulating totals of the number of printing characters are less than default value N, ink judges that it is still and will be in the standby condition of data again.

[0031] Since the ink residue information in a cartridge has been acquired by carrying out counting of the number of printing characters in this example, without using a level sensor etc. as explained above, an ink residue is detectable in a stable precision. Moreover, while being able to attain low cost-ization of a cartridge by it becoming unnecessary forming a level sensor etc. in a cartridge, since it is not necessary to discard a level sensor etc. to coincidence also when a cartridge is discarded, the futility of a resource is lost.

[0032] (The 3rd example) Drawing 7 is the outline block diagram of the 3rd example of the recording apparatus of this invention. As the recording apparatus of this example is the laser beam printer of the Rhine scan mold and is shown in drawing 7 The data analysis section 21 which analyzes received data, and the dot image formation block 22 which performs image expansion of the data analyzed in the data analysis section 21, The video interface circuitry 23 which receives the image data developed with the dot image formation block 22, and generates a video signal, The printer device section 24 equipped with the recording head (un-illustrating) which records on recorded media based on the video signal generated by the video interface circuitry 23, It consists of a counter circuit 25 which carries out counting of the pulse signal of the video signal generated by the video interface circuitry 23, and nonvolatile memory 26 which adds and memorizes the value of a counter circuit 25. Here, whenever a recording apparatus is equipped with the cartridge (un-illustrating) as a member hold container for record with which nonvolatile memory 26 is formed in the body of a recording apparatus free [attachment and detachment], the contents of storage are cleared. namely, the number of dots which the number of accumulation record dots from the time of the body of a recording device being equipped with a cartridge was memorized by nonvolatile memory 26, and was recorded on it by a counter circuit 25 and nonvolatile memory 26 -- counting -- carrying out -- counting -- counting which offers the residue information on the member for record in the member hold container for record based on a result -- a means is constituted. Moreover, ink consumption required to print one dot is beforehand calculated by measurement etc., and makes the total number of dots for consuming all the ink in said cartridge here default value valve flow coefficient.

[0033] Next, it explains, referring to the flow chart shown in drawing 8 about actuation of this recording apparatus. First, if a power source is supplied to a recording device, initialization processing of the recording device itself will be performed (S801). A counter circuit 25 is reset at this time, and that value serves as zero. Next, it will be in a standby condition until it receives printing character data (S802, S803). Reception of printing character data analyzes the received data in the data analysis section 21 (S804). And the analyzed data are developed to an image data with the dot image formation block 22 (S805), and delivery and printing are further performed for this image data in the printer device section 24 (S806). At this time, a counter circuit 25 counts the pulse signal from the video interface circuitry 23, and is recording the number of dots of printing data. If printing is completed, the number of dots counted in the counter circuit 25 will be added to nonvolatile memory 26, and it will ask for the total number of dots in this cartridge. Here, when printing is performed by the cartridge same also before this printing, the total number of dots to printing before this printing is memorized by nonvolatile memory 26, and it is asked for the total number of dots in the same cartridge by adding the number of dots

counted for every printout in the counter circuit 25, and updating that value. And the total number of dots called for by S807 is compared with the value of the default value valve flow coefficient mentioned above (S808), and it judges whether it is an ink piece. Namely, when the total number of dots exceeds default value valve flow coefficient, after judging it as an ink piece and performing ink piece warning (S809), the value of a counter circuit 25 is reset, and it considers as zero (S810), and will be in the standby condition of data again. When the total number of dots is less than default value valve flow coefficient, ink judges that it is still, resets a counter circuit 25 as it is (S810), and will be in the standby condition of data again.

[0034] Also in this example, the same effectiveness as the 2nd example is acquired by carrying out counting of the total number of dots, and acquiring the ink residue information in a cartridge.

[0035] (The 4th example) Drawing 9 is the outline block diagram of the 4th example of the recording apparatus of this invention. The recording apparatus of this example are yellow, a Magenta, cyanogen, and a color picture recording apparatus that records a color picture using the ink of four colors of black, and have CPU53 which controls this whole color picture recording apparatus on that body 51 of a color picture recording apparatus according to the program stored in the program ROM 55 mentioned later. After a receive buffer 54 stores temporarily the color picture data sent with a host computer 52, it is sent to CPU53. The program ROM 55 as a decision means is for CPU53 to control a color picture recording device, and the program with the algorithm shown in drawing 10 is stored. A frame buffer 56 is the memory holding the binary image pattern generated for every ink color, and has four buffers 56a, 56b, 56c, and 56d for every ink color. The color picture output section 58 equipped with the recording head (un-illustrating) has the delivery (un-illustrating) of every plurality for every ink color, respectively, and records on recorded media by carrying out the regurgitation of the ink from said delivery according to the image pattern for every ink color in a frame buffer 56. The ink residue detecting element 57 as an amount detection means of ink is formed in four ink hold containers (un-illustrating) for every ink color for holding the ink of each color, respectively, can detect the residue of the ink for every ink color, and can send the value now to CPU53. The ink in each ink hold container is supplied to each delivery corresponding to each ink color of the color picture output section 58 through an ink supply path (un-illustrating), respectively. The dot counter section 59 as a calculation means processes the color picture data sent from the host computer 52, and is generated, within the image pattern binary [for every color currently held in the frame buffer 56], it is the memory holding the value which counted the number of dots which should be recorded, and four dot counters 59a, 59b, 59c, and 59d for every color are formed. The ink consumption maintenance field 60 calculates and holds the amount of ink consumed when it recorded on the recorded media of one sheet, and four ink consumption maintenance fields 60a, 60b, 60c, and 60d for every color are formed like the dot counter section 59. The work-piece field 61 is memory used as a work-piece field, this memory is used, a binary image pattern is generated from image data, or various processings of count of the amount of use schedules of ink etc. are performed. And the existence of the abnormalities of this color picture recording apparatus etc. is displayed on the message indicator section 62 as an information means. Next, image recording actuation of this example and delivery actuation of recorded media are explained, referring to drawing 10 . Drawing 10 is a flow chart which shows the procedure of delivery processing with the recording apparatus shown in drawing 9 , and shows the part of the processing to the delivery instruction of the programs stored in the program ROM 55. In addition, although the color picture recording apparatus of this example generates the binary image pattern of a color, since well-known processing is sufficient as processing of generation of a binary image pattern etc. and it is not applied to direct this invention, interpreting reception and the various commands contained in it, and performing color picture data from a host computer

52, the explanation is omitted here.
[0036] It is started when the delivery instruction in the color picture data sent from the host computer 52 has been recognized, and the processing shown in drawing 10 counts first the number of dots which should be recorded for every binary pattern of each color in a frame buffer 56, and sets the value to the dot counters 59a, 59b, 59c, and 59d corresponding to each color of the dot counter section 59, respectively (S1001). Next, from the counted number of dots, the amount of use schedules of ink required to record the image in a frame buffer 56 is calculated for every color, and it holds in the work-piece field 61 (S1002). Here, the amount of use schedules of ink is shown by the value which multiplied the ink consumption per dot by the number of record dots, and the ink consumption per dot is beforehand held in the program ROM 55. Next, the ink residue detecting element 57 detects the ink residue in front of image recording for every color, and the ink residue for every color is stored in the maintenance fields 60a, 60b, and 60c corresponding to each color of the amount maintenance field 60 of the ink used, and 60d, respectively (S1003). And paper is delivered to recorded media, recording an image on recorded media by the color picture output section 58 according to the binary image pattern of each color currently held in the frame buffer 56 (S1004).
[0037] If all the image patterns in a frame buffer 56 are recorded, again, the ink residue for every color will be read from the ink residue detecting element 57, and it will subtract from the value in which the value is stored in each maintenance fields 60a, 60b, and 60c of the ink consumption maintenance field 60, and 60d, respectively (S1005). When an image is recorded on the ink consumption maintenance field 60, it means that the actually consumed ink consumption was held for every color by this. Next, it judges whether the image recorded by the blinding of a delivery etc. is blurred based on the actually consumed ink consumption and the amount of ink use schedules currently held in the work-piece field 61 (S1006). That is, when the relation expressed with the formula of >=(actual ink consumption) (amount of ink use schedules)-(consumption allowed value) between actual ink consumption and amounts of ink use schedules is materialized, it is thought that ink is breathed out as planned, therefore it can be considered that the image is also recorded correctly. Here, the consumption allowed value in an upper type is the correction value in consideration of the detection error in the ink residue detecting element 57, dispersion of the discharge quantity of the ink per dot, etc., and this value is beforehand stored in the program ROM 55. On the other hand, when the relation of an upper type is not materialized, it is thought that ink was not breathed out normally and it can be considered that abnormalities, such as a blur and a poor color tone, have arisen in the recorded image.
[0038] When it is judged that it is normal and was normally recorded based on the relation of an upper type, delivery processing is ended as it is. On the other hand, when it is judged that it is abnormal, a warning message is displayed on the message indicator section 62, and delivery (S1007) processing is ended.
[0039] As explained above, when it judges whether there are any abnormalities, such as a blur depended insufficient [supply of the blinding of a delivery or the ink to a delivery] based on actual ink consumption at the time of record of a 1-page image, for recording device itself and abnormalities are discovered, it becomes possible to warn a user promptly. Since the abnormalities of an image can be detected by this, without being based on visual decision of a user, said abnormalities can be discovered more certainly. Moreover, when it differs from the thing specified by the outputted color tone, if a warning message is displayed on the message indicator section 62, the regurgitation of ink is unusual, but since it can say that the error of color specification is the cause when a warning message is not displayed, the error of color specification can be corrected immediately and the image of a right color tone can be recorded.
[0040] In this example, although the ink used in order to record a color picture showed the

example of the thing of four colors of yellow, a Magenta, cyanogen, and black, only three colors of not only it but yellow and Magenta cyanogen are not used, or this invention is not limited to the color of the ink which a color picture recording device has using the ink of other colors. Moreover, although 1 pixel (1 bit) of the binary image pattern in a frame buffer 56 was premised on corresponding to 1 dot of the image actually recorded, this invention is not limited to the number of dots of the record image corresponding to 1 pixel of the binary image pattern in a frame buffer 56, and may correspond to two or more dots whose 1 pixel of a binary image pattern is a record pixel.

[0041] (The 5th example) Drawing 11 is the outline block diagram of the 5th example of the recording apparatus of this invention. Image data from a host computer 72 like [the recording apparatus of this example] the thing of the 4th example Reception, From the image data, yellow, a Magenta, cyanogen, and the binary image pattern for every four colors of black are generated. It is what records the image pattern of these four colors in piles on recorded media. CPU73 and the receive buffer 74 which were prepared in the body 71 of a color picture recording apparatus, a frame buffer 76, the ink residue detecting element 77, the color picture output section 78, the dot counter section 79, the ink consumption maintenance field 80, and the work-piece field 81 Since you may be the same as that of the thing of the 4th example respectively, the explanation is omitted.

[0042] Differing from the thing of the 4th example by this example is the point that the recovery-score maintenance field 82 as the contents and the maintenance means of the program stored in the program ROM 75 as a decision means and the recovery device (un-illustrating) as a recovery means are formed. The program stored in the program ROM 75 has the algorithm shown in drawing 12 , and mentions it later about the detail. The recovery-score maintenance field 82 holds the recovery score used in order to judge whether improvement in record image grace can be expected by performing recovery once again with a recovery device. Moreover, when blinding etc. arises in the delivery of the color picture output section 78, said recovery device performs ink feeding by the proper pressurization means formed in the ink supply path to ink suction or the ink jet recording head by the proper suction means, makes ink discharge more compulsorily than a delivery, and performs head recovery of removing the thickening ink in a delivery.

[0043] Next, image recording actuation of this example and delivery actuation of recorded media are explained, referring to drawing 12 . Drawing 12 is a flow chart which shows the procedure of delivery processing with the recording apparatus shown in drawing 11 , and shows the part of the processing to the delivery instruction of the programs stored in the program ROM 75.

[0044] It is started when the delivery instruction in the color picture data sent from the host computer 72 has been recognized, and the processing shown in drawing 12 counts first the number of dots which should be recorded for every binary pattern of each color in a frame buffer 76, and sets the value to the dot counters 79a, 79b, 79c, and 79d corresponding to each color of the dot counter section 79, respectively (S1201). Next, the value of the recovery score in the recovery-score field 82 is initialized (S1202). The value of the amount of the ink which is needed as initial value at this time in the whole surface of the page which will record an image from now on when recording four colors in piles is used. Next, from the counted number of dots, the amount of use schedules of ink required to record the image in a frame buffer 76 is calculated for every color, and it holds in the work-piece field 81 (S1203). Here, the amount of use schedules of ink is shown by the value which multiplied the ink consumption per dot by the number of record dots, and the ink consumption per dot is beforehand held in the program ROM 75. Next, the ink residue detecting element 77 detects the ink residue in front of image recording for every color, and the ink residue for every color is stored in the maintenance fields 80a, 80b, and 80c

corresponding to each color of the amount maintenance field 80 of the ink used, and 80d, respectively (S1204). And paper is delivered to recorded media, recording an image on recorded media by the color picture output section 78 according to the binary image pattern of each color currently held in the frame buffer 76 (S1205).

[0045] If all the image patterns in a frame buffer 76 are recorded, again, the ink residue for every color will be read from the ink residue detecting element 77, and it will subtract from the value in which the value is stored in each maintenance fields 80a, 80b, and 80c of the ink consumption maintenance field 80, and 80d, respectively (S1206). When an image is recorded on the ink consumption maintenance field 80, it means that the actually consumed ink consumption was held for every color by this. Next, it judges whether there are any abnormalities, like based on the actually consumed ink consumption and the amount of ink use schedules currently held in the work-piece field 81, the image recorded by the blinding of a delivery etc. becomes blurred like the 4th example (S1207).

[0046] Here, it is judged that there are no abnormalities of an image, in other cases, delivery processing is ended as it is, and when it is judged that there are abnormalities of an image, it judges whether there is any restorative hope (S1208). Here, the value currently held to the recovery-score maintenance field 82 at the time is compared with the total value of the difference of the amount of use schedules of the ink for every color currently computed previously, and actual consumption. That is, they are EY, EM, EC, and EK, respectively about the value which subtracted actual consumption from the amount of use schedules of ink for every color. When it carries out, it is >(value of recovery-score maintenance field) EY+EM+EC+EK+EX. It judges whether conditional expression is filled. Inside EX of this conditional expression It is the correction value in consideration of dispersion in the detection error in the ink residue detecting element 77, and the discharge quantity of the ink per dot, and is the constant value beforehand held in the program ROM 75.

[0047] When the above-mentioned conditional expression is not filled here, even if it performs recovery, it is judged that there is no restorative hope, and delivery processing is ended as it is. On the other hand, when the above-mentioned conditional expression is filled, after judging that there is a restorative hope and rewriting the value of a recovery-score maintenance field to the value of (EY+EM+EC+EK), recovery of the color picture output section 78 is performed (S1209). And if recovery of the color picture output section 78 is performed, an ink residue will be again detected for every color by the ink residue detecting element 77 (S1204), and image recording will be redone.

[0048] Although judged by the comparison with the initial value currently held to the recovery-score maintenance field 82 at the time of the 1st decision, since this initial value is a very big value as mentioned above, the above-mentioned conditional expression is surely filled with decision whether there is any restorative hope explained above. For this reason, when it is judged that abnormalities, such as a blur, are in an image from the difference of the amount of use schedules of ink and actual consumption after the 1st image recording, it surely operates once so that recovery may be performed and image recording may be performed again. Then, since the value of the recovery-score maintenance field 82 turns into total value of four colors of the difference of the amount of the ink used before performing the last recovery, and actual consumption, the effectiveness of the last recovery can be judged by the above-mentioned conditional expression at the time of decision of the 2nd henceforth. That is, it judges whether judging whether there is any restorative hope by whether the above-mentioned conditional expression is filled or there is nothing had the effective recovery performed last time, when effective, recovery is performed once again, recovery of the color picture output section 78 is aimed at, and on the other hand, when not effective, it means not performing useless recovery

action.
[0049] It becomes unnecessary to carry out recovery automatically and to be able to rerecord an image, as long as it is effective when the abnormalities of an image are detected while detecting abnormalities of an image, such as a blur, based on ink consumption at the time of record of a 1-page image as explained above, and for a user to operate a recovery device each time. Moreover, since it has judged whether the recovery was effective while performing recovery, when recovery is not effective, the next recovery and record are not performed, but neither a recorded member nor ink is consumed vainly.
[0050] Moreover, also in this example, like the 4th example, especially the color of ink is not restricted and 1 pixel of a binary image pattern may correspond to two or more dots of a record image.
[0051] This invention forms a flight-drop also in a recording apparatus, especially using heat energy, and brings about the outstanding effectiveness in the recording apparatus of the ink jet method which records.
[0052] About the typical configuration and typical principle, what is performed using the fundamental principle currently indicated by the U.S. Pat. No. 4723129 specification and the 4740796 specification, for example is desirable. Although this method is applicable to both the so-called mold on demand and a continuous system On the electric thermal-conversion object which is especially arranged corresponding to the sheet and liquid route where the liquid (ink) is held in the case of the mold on demand By impressing at least one driving signal which gives the rapid temperature rise which supports recording information and exceeds nucleate boiling Since make an electric thermal-conversion object generate heat energy, the heat operating surface of a recording head is made to produce film boiling and the air bubbles in the liquid (ink) corresponding to this driving signal can be formed by one to one as a result, it is effective. A liquid (ink) is made to breathe out through opening for regurgitation by growth of these air bubbles, and contraction, and at least one drop is formed. If this driving signal is made into the shape of a pulse form, since growth contraction of air bubbles will be performed appropriately instancy, the regurgitation of a liquid (ink) excellent in especially responsibility can be attained, and it is more desirable.
[0053] As a driving signal of the shape of this pulse form, what is indicated by the U.S. Pat. No. 4463359 specification and the 4345262 specification is suitable. In addition, if the conditions indicated by the U.S. Pat. No. 4313124 specification of invention about the rate of a temperature rise of the above-mentioned heat operating surface are adopted, further excellent record can be performed.
[0054] The configuration using the U.S. Pat. No. 4558333 specification and U.S. Pat. No. 4459600 specification which indicate the configuration arranged to the field to which the heat operation section other than the combination configuration (a straight-line-like liquid flow channel or right-angle liquid flow channel) of a delivery which is indicated by each above-mentioned specification, a liquid route, and an electric thermal-conversion object is crooked as a configuration of a recording head is also included in this invention.
[0055] In addition, this invention is effective also as a configuration based on JP,59-138461,A which indicates the configuration whose puncturing which absorbs the pressure wave of JP,59-123670,A which indicates the configuration which uses a common slit as the discharge part of an electric thermal-conversion object to two or more electric thermal-conversion objects, or heat energy is made to correspond to a discharge part.
[0056] Furthermore, although any of the configuration which fills the die length with the combination of two or more recording heads which are indicated by the specification mentioned above as a recording head of the full line type which has the die length corresponding to the

width of face of the maximum record medium which can record a recording device, and the configuration as one recording head formed in one are sufficient, this invention can demonstrate the effectiveness mentioned above much more effectively.

[0057] In addition, this invention is effective also when the recording head of the exchangeable chip type with which the electric connection with the body of equipment and supply of the ink from the body of equipment are attained, or the recording head of the cartridge type with which the ink tank was formed in the recording head itself in one is used by the body of equipment being equipped.

[0058] Moreover, since the effectiveness of this invention can be stabilized further, it is desirable to add the recovery means against a recording head established as a configuration of the recording device of this invention, a preliminary auxiliary means, etc. If these are mentioned concretely, it is effective in order to perform record stabilized by performing the preheating means by the capping means, the cleaning means, the pressurization or the suction means, the electric thermal-conversion object, the heating elements different from this, or such combination over a recording head, and reserve regurgitation mode in which the regurgitation different from record is performed.

[0059] Furthermore, as a recording mode of a recording device, not only the recording mode of only mainstream colors, such as black, but a recording head is constituted in one, or this invention is very effective also in the equipment equipped with full color at least one by the double color color of a different color, or color mixture even with two or more combination although it was good.

[0060] In this invention example explained above, although ink is explained as a liquid The thing which is ink solidified less than [a room temperature or it], and is softened at a room temperature, or the thing which is a liquid, Or by the above-mentioned ink jet method, since what carries out temperature control is common as a temperature control is performed for ink itself within the limits of 30 degrees C or more 70 degrees C or less and it is in the stabilization regurgitation range about the viscosity of ink, ink should just make the shape of liquid at the time of use record signal grant.

[0061] In addition, it carries out whether the ink which prevents by making the temperature up by heat energy use it positively as energy of the change of state from a solid condition to the liquid condition of ink, or is solidified in the state of neglect for the purpose of antiflashing of ink is used. Anyway, ink liquefies by grant according to the record signal of heat energy. Use of the ink of the property which will not be liquefied without heat energy, such as what carries out the regurgitation as liquefied ink, and a thing which it already begins to solidify when reaching a record medium, is also applicable to this invention. In such a case, ink is good for a porosity sheet crevice or a through tube which is indicated by JP,54-56847,A or JP,60-71260,A also as liquefied or a gestalt which counters to an electric thermal-conversion object in the condition of having been held as a solid. In this invention, the most effective thing performs the film-boiling method mentioned above to each ink mentioned above.

[0062] Furthermore, in addition, as a gestalt of the recording device concerning this invention, although prepared in one or another object as an image printing terminal of information management systems, such as a word processor and a computer, the gestalt of the reproducing unit combined with others and a reader and the facsimile apparatus which has a transceiver function further may be taken.

[0063]

[Effect of the Invention] Since this invention is constituted as it was explained above, the effectiveness indicated below is done so.

[0064] In invention according to claim 1, by forming a storage means in the member hold

container for record, and establishing the control means for writing information for a storage means further, while being able to give the information on more arbitration to the member hold container for record, rewriting of the information can also be performed freely and can raise the versatility of the member hold container for record. Moreover, since it also becomes unnecessary to change the configuration of the member hold container for record like before in order to identify the member hold container for record, the configuration of the member hold container for record can be unified, as a result low cost-ization can be attained. Furthermore, reuse of the member hold container for record also becomes easy by rewriting freely the information memorized by the storage means.

[0065] the number of alphabetic characters recorded in invention according to claim 2 -- counting -- carrying out -- said counting -- counting which offers the residue information on the member for record in said member hold container for record based on a result -- even if it does not form a level sensor in the member hold container for record, the residue of the member for record can detect by carrying out counting of the number of record alphabetic characters, and more exact residue information can acquire by having a means. Moreover, the futility of a resource can be lost, also in case low cost-ization of the member hold container for record can be attained and the member hold container for record is discarded further, since it is not necessary to form a level sensor. and counting -- the effectiveness same also as what carries out counting of the number of dots recorded in the means is acquired.

[0066] A calculation means to compute the amount of ink use schedules in invention according to claim 4, An amount detection means of ink to detect the amount of ink in an ink hold container, and the amount of ink use schedules and the ink consumption actually used for record are measured. By displaying that on an information means, when it has a decision means to judge the existence of the abnormalities of the record image by the blinding of a delivery, or the fault of the supply of ink to a delivery and is abnormal Since it becomes possible to judge said abnormalities automatically with the recording device itself even if a user does not check visually, there is also no oversight of said abnormalities of a user and said abnormalities can be discovered certainly.

[0067] When the abnormalities of the record image by the blinding of a delivery or the fault of the supply of ink to a delivery are detected in invention according to claim 5 in addition to the effectiveness mentioned above By a recovery means' performing recovery based on the difference of the amount of ink use schedules calculated with the maintenance means, and actual ink consumption, as long as there is a restorative hope, and repeating doing image recording again again Even if a user does not operate a recovery means, recovery is automatically made each time until a recording head is recovered, and the image finally recorded correctly can be obtained. Moreover, since decision whether recovery was effective is also performed with the decision means, when recovery is not effective, the next recovery and record are not performed, but neither recorded media nor ink is consumed vainly.

TECHNICAL FIELD

[Industrial Application] This invention relates to the recording device which records by making members for record, such as ink and a toner, adhere to recorded media.

PRIOR ART

[Description of the Prior Art] Conventionally, if the member stowage container for record (henceforth a "cartridge") which contains members for record, such as ink for recording on

recorded media in a recording device and a toner, is prepared in the body of a recording device free [attachment and detachment] and the member for record is lost with record, what exchanges a cartridge for a new thing is known well. There are various classes of cartridges and it is necessary to change control of the body of a recording device according to the class of cartridge with which it is equipped in that case. Then, this was realized by a class, a property, etc. of a cartridge changing the appearance configuration of a cartridge for every class of cartridge as a means to offer the information on a cartridge proper to the body of a recording apparatus, and making the microswitch formed in the body of a recording apparatus by equipping the body of a recording apparatus with a cartridge push.

[0003] Moreover, offering the residue information on the member for record in a cartridge was also performed by forming a level sensor in a cartridge and outputting the information from this level sensor to the body of a recording apparatus.

[0004] In the ink jet recording device which records on recorded media by carrying out the regurgitation of the ink from a delivery on the other hand, it originates in the blinding of a delivery, the short supply of the ink to a delivery, etc., and, partially or on the whole, ink may not no longer be breathed out. Then, in the usual ink jet recording device, the recovery device for maintaining a delivery and its circumference at clarification etc. was formed, and when the fault mentioned above occurred, recovery by said recovery device etc. was performed.

EFFECT OF THE INVENTION

[Effect of the Invention] Since this invention is constituted as it was explained above, the effectiveness indicated below is done so.

[0064] In invention according to claim 1, by forming a storage means in the member hold container for record, and establishing the control means for writing information for a storage means further, while being able to give the information on more arbitration to the member hold container for record, rewriting of the information can also be performed freely and can raise the versatility of the member hold container for record. Moreover, since it also becomes unnecessary to change the configuration of the member hold container for record like before in order to identify the member hold container for record, the configuration of the member hold container for record can be unified, as a result low cost-ization can be attained. Furthermore, reuse of the member hold container for record also becomes easy by rewriting freely the information memorized by the storage means.

[0065] the number of alphabetic characters recorded in invention according to claim 2 -- counting -- carrying out -- said counting -- counting which offers the residue information on the member for record in said member hold container for record based on a result -- even if it does not form a level sensor in the member hold container for record, the residue of the member for record can detect by carrying out counting of the number of record alphabetic characters, and more exact residue information can acquire by having a means. Moreover, the futility of a resource can be lost, also in case low cost-ization of the member hold container for record can be attained and the member hold container for record is discarded further, since it is not necessary to form a level sensor. and counting -- the effectiveness same also as what carries out counting of the number of dots recorded in the means is acquired.

[0066] A calculation means to compute the amount of ink use schedules in invention according to claim 4, An amount detection means of ink to detect the amount of ink in an ink hold container, and the amount of ink use schedules and the ink consumption actually used for record are measured. By displaying that on an information means, when it has a decision means to judge the existence of the abnormalities of the record image by the blinding of a delivery, or the fault

of the supply of ink to a delivery and is abnormal Since it becomes possible to judge said abnormalities automatically with the recording device itself even if a user does not check visually, there is also no oversight of said abnormalities of a user and said abnormalities can be discovered certainly.

[0067] When the abnormalities of the record image by the blinding of a delivery or the fault of the supply of ink to a delivery are detected in invention according to claim 5 in addition to the effectiveness mentioned above, based on the difference of the amount of ink use schedules calculated with the maintenance means, and actual ink consumption, it repeats a recovery means performing recovery, as long as there is a restorative hope, and doing image recording again again. Even if a user does not operate a recovery means, recovery is automatically made each time until a recording head is recovered, and the image finally recorded correctly can be obtained. Moreover, since decision whether recovery was effective is also performed with the decision means, when recovery is not effective, the next recovery and record are not performed, but neither recorded media nor ink is consumed vainly.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, in the thing which was mentioned above and which changes the configuration of a cartridge for every class of cartridge, it was difficult to offer much information. Moreover, since the informational contents are decided by the configuration of a cartridge and only lasting information can be offered For example, since information on new arbitration, such as a residue of the member for record in the member hold container for record, cannot be given, either It records, although there are few residues of the member for record, and the member for record is lost in the middle of record. Record grace falls or Although it thought that there were few residues of the member for record and the member hold container for record was exchanged for the new thing, it in fact still remains so much, and there was a trouble that the futility of a resource will arise. Furthermore, there was also a trouble that only the same information can be given also when a cartridge is reused, and versatility could not be given.

[0006] Moreover, in what formed the level sensor in the cartridge, the measurement result by the level sensor is ambiguous, and a different value for every measurement will not be detected, or unless it is in the condition which moreover stood it still on the function in the level location, exact measurement will not be able to be performed, but uncertain information will be offered. Consequently, although the member hold container for record was exchanged for the new thing since it detected when it was still so much, although there were few residues of the member for record, the member for record was lost in the middle of record, or it was detected when there was little remainder of the member for record There was a possibility that the case where it in fact still remains so much might occur, and there was a trouble that deterioration of record grace and the futility of a resource may arise.

[0007] On the other hand, in the ink jet recording device, the information about the poor regurgitation of the ink which originates insufficient [supply of the blinding of a delivery or the ink to a delivery] was undetectable, and since the user had looked at and judged the actually outputted record object, it had a trouble as shown below.

[0008] (1) When the blinding of a delivery is slight, since the fault by that appears in some recorded images, it may not be found only by glancing at the recorded image.

[0009] (2) In a color picture recording device, when it differs from the color specified by the recorded color, it cannot immediately judge in the thing which are the abnormalities of a recording device about whether color specification was mistaken.

[0010] (3) When performing record of two or more sheets continuously especially, even if the poor regurgitation of ink occurs in the middle of record, if a user does not notice it, record is performed to the last and a lot of recorded media as the result may become useless.
[0011] A residue, record grace, etc. of the class of cartridge or the member for record have various information about record, and the purpose of this invention raises record grace by detecting it certainly, and is to offer the recording device which does not consume a resource vainly further.

MEANS

[Means for Solving the Problem] The recording head which this invention makes the member for record adhere to recorded media, and records on said recorded media in order to attain the above-mentioned purpose, In the recording device which records on the body of a recording device using the member hold container for record prepared free [attachment and detachment] while holding said member for record supplied to said recording head When said body of a recording device is equipped with said member hold container for record, it is characterized by having a control means for carrying out read-out and the writing of said information to a storage means formed in said member hold container for record to memorize the information on arbitration temporarily or everlastingly.
[0013] Moreover, it sets to the recording device which records using the recording head which the member for record is made to adhere to recorded media, and records an alphabetic character on said recorded media, and the record member hold container which holds said member for record supplied to said recording head. the recorded number of alphabetic characters -- counting -- carrying out -- said counting -- counting which offers the residue information on the member for record in said member hold container for record based on a result -- what is characterized by having a means -- In the recording device which records using the recording head which the member for record is made to adhere to recorded media, and records on said recorded media, and the record member hold container which holds said member for record supplied to said recording head the recorded number of dots -- counting -- carrying out -- said counting -- counting which offers the residue information on the member for record in said member hold container for record based on a result -- it may be characterized by having a means.
[0014] Furthermore, the recording head in which the delivery for carrying out the regurgitation of the ink towards recorded media was established, It records using the ink hold container which holds the ink supplied to said recording head. In the recording device which records on said recorded media by generating an image pattern based on the image formation data inputted from the information generation source, and carrying out the regurgitation of the ink from said delivery according to said image pattern counting which carries out counting of the number of record dots for said every recorded media based on said image pattern -- with a means A calculation means to compute the amount of ink use schedules from said number of record dots by which counting was carried out, An amount detection means of ink to detect the amount of ink in said ink hold container, and the amount of ink use schedules computed by said calculation means, A decision means to measure the ink consumption actually used for the record which might be based on the amount of ink detected by said amount detection means of ink, and to judge the existence of the abnormalities of a record image, and when it is judged that abnormalities are in said record image what has an information means to tell a user about the abnormalities of said record image, and counting which carries out counting of the number of record dots for said every recorded media based on said image pattern -- with a means A calculation means to compute the amount of ink use schedules from said number of record dots

by which counting was carried out, An amount detection means of ink to detect the amount of ink in said ink hold container, and the amount of ink use schedules computed by said calculation means, A maintenance means to calculate a difference with the ink consumption actually used for the record which might be based on the amount of ink detected by said amount detection means of ink, and to hold the value, The existence of the abnormalities of a record image is judged by the comparison with a recovery means to perform recovery for maintaining said recording head at clarification, and said amount of ink use schedules and said ink consumption. When abnormal, after operating said recovery means, when it judges the effectiveness of the recovery by said recovery means from the difference of the amount of ink use schedules and ink consumption which were held at said maintenance means and it is judged that it is effective, you may have a decision means to perform image recording again.

[0015] And the recording head may be equipped with the electric thermal-conversion object for generating the heat energy for ink regurgitation in each invention mentioned above, and a recording head may make ink breathe out from a delivery further with the heat energy impressed with an electric thermal-conversion object using the change of state produced in ink.

OPERATION

[Function] In invention according to claim 1 constituted as above-mentioned, the member hold container for record has a storage means to memorize the information on arbitration temporarily or everlastingly, and the information about the member hold container for record is memorized by this storage means. Being able to give the information on arbitration by this, to the member hold container for record, even if it does not change the configuration of the member hold container for record, moreover, this amount of information will become [many] as compared with the case where the configuration of the member hold container for record is changed. Moreover, the versatility of the member hold container for record also increases by rewriting the contents of the information memorized by the storage means.

[0017] the number of alphabetic characters recorded in invention according to claim 2 -- counting -- carrying out -- said counting -- counting which offers the residue information on the member for record in said member hold container for record based on a result -- if the amount of the member for record used per character calculates statistically beforehand, the amount of the member for record used consumed by record will be calculated by carrying out counting of the number of record alphabetic characters by having a means. Since the amount (initial value) of the member for record held in the member hold container for record in the intact condition on the other hand is also known beforehand, the residue information on the member for record in the member hold container for record is acquired by measuring said initial value and said amount used.

[0018] Also in invention according to claim 3, the residue information on the member for record in the member hold container for record is acquired by carrying out counting of the recorded number of dots like invention according to claim 2 based on it.

[0019] In invention according to claim 4, if an image pattern is generated from image formation data, while the amount of ink use schedules will be computed based on the image pattern by the calculation means, the amount of ink in an ink hold container is detected by the amount detection means of ink. On the other hand, after image recording is completed, the amount of ink in an ink hold container is again detected by the amount detection means of ink, and the amount of ink actually used for record by subtracting the amount of ink after record from the amount of ink before record is calculated. And in below the value to which the value of the amount of ink which measured the amount of ink use schedules and the amount of ink actually used for record,

and was actually used for record with the decision means subtracted the correction value in consideration of dispersion in ink discharge quantity etc. from the amount of ink use schedules, they are the blinding of a delivery, the short supply of the ink to a delivery, etc. It judges that ink is not breathed out normally and it is displayed on an information means that ink is not breathed out normally. Thereby, even if a user does not judge the record situation of recorded media visually, the information on the existence of abnormalities is offered by the recording device, and overlooking of a user of the record grace of the recorded media with which record was performed is also lost.

EXAMPLE

[Example] Next, the example of this invention is explained with reference to a drawing.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the important section outline block diagram of the 1st example of the recording apparatus of this invention.
[Drawing 2] It is the timing chart which showed the lead of the data in the recording apparatus shown in drawing 1 , and the light process, and (B of (A) of this drawing) of the timing chart of a light process and this drawing is the timing chart of a lead process.
[Drawing 3] It is the flow chart which shows the write-in procedure of the data to the cartridge shown in drawing 1 .
[Drawing 4] It is the flow chart which shows the reading procedure of the data from the cartridge shown in drawing 1 .
[Drawing 5] It is the outline block diagram of the 2nd example of the recording apparatus of this invention.
[Drawing 6] It is the outline flowchart which shows actuation of the whole recording apparatus shown in drawing 5 .
[Drawing 7] It is the outline block diagram of the 3rd example of the recording apparatus of this invention.
[Drawing 8] It is the outline flowchart which shows actuation of the whole recording apparatus shown in drawing 7 .
[Drawing 9] It is the outline block diagram of the 4th example of the recording apparatus of this invention.
[Drawing 10] It is the flow chart which shows the procedure of delivery processing with the recording apparatus shown in drawing 9 .
[Drawing 11] It is the outline block diagram of the 5th example of the recording apparatus of this invention.
[Drawing 12] It is the flow chart which shows the procedure of delivery processing with the recording apparatus shown in drawing 11 .
[Description of Notations]
1 Control Board
2 Cartridge
3 Cartridge Side Control Section
4, 17, 26 Nonvolatile memory
11 Interface
12, 53, 73 CPU

13 ROM Component
14 RAM Component
14a The number count area of alphabetic characters
15 Font ROM Component
16 Printing Section
21 Data Analysis Section
22 Dot Image Formation Block
23 Video Interface Circuitry
24 Printer Device Section
25 Counter Circuit
51 71 Body of a color picture recording device
52 72 Host computer
54 74 Receive buffer
55 75 Program ROM
56 76 Frame buffer
57 77 Ink residue detecting element
58 78 Color picture output section
59 79 Dot counter section
60 80 Ink consumption maintenance field
61 81 Work-piece field
62 Message Indicator Section
82 Recovery-Score Maintenance Field

[Translation done.]

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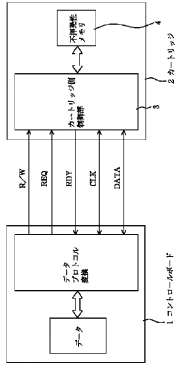
(54)【発明の名称】　記録装置

(57)【要約】

【目的】　カートリッジの種類や記録用部材の残量や記録品位等、記録に関する様々な情報を持ち、それを確実に検出することで記録品位を向上させる。

【構成】　記録用部材を収容するカートリッジ２は不揮発性メモリ４を有する。カートリッジ２に収容された記録用部材は、不図示の供給管を介して不図示の記録ヘッドに供給される。不揮発性メモリ４は、カートリッジ側制御部４を介して、記録装置本体のコントロールボード１に複数の信号線によって接続される。これによりカートリッジ２に、カートリッジ２の種類や記録用部材の残量等任意の情報を書き込んだり、カートリッジ２に書き込まれている情報を記録装置本体に読み出すことができる。



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【特許請求の範囲】

【請求項１】　被記録媒体に記録用部材を付着させて前記被記録媒体に記録を行なう記録ヘッドと、前記記録ヘッドに供給される前記記録用部材を収容するとともに記録装置本体に着脱自在に設けられた記録用部材収容容器とを用いて記録を行なう記録装置において、

前記記録用部材収容容器が前記記録装置本体に装着されているときに、前記記録用部材収容容器に設けられた、任意の情報を一時的あるいは恒久的に記憶する記憶手段に、前記情報の読み出しおよび書き込みを行なうための制御手段を有することを特徴とする記録装置。

【請求項２】　被記録媒体に記録用部材を付着させて前記被記録媒体に文字の記録を行なう記録ヘッドと、前記記録ヘッドに供給される前記記録用部材を収容する記録部材収容容器とを用いて記録を行なう記録装置において、

記録された文字数を計数し、前記計数結果に基づいて前記記録用部材収容容器内の記録用部材の残量情報を提供する計数手段を有することを特徴とする記録装置。

【請求項３】　被記録媒体に記録用部材を付着させて前記被記録媒体に記録を行なう記録ヘッドと、前記記録ヘッドに供給される前記記録用部材を収容する記録部材収容容器とを用いて記録を行なう記録装置において、

記録されたドット数を計数し、前記計数結果に基づいて前記記録用部材収容容器内の記録用部材の残量情報を提供する計数手段を有することを特徴とする記録装置。

【請求項４】　被記録媒体に向けてインクを吐出するための吐出口が設けられた記録ヘッドと、前記記録ヘッドに供給されるインクを収容するインク収容容器とを用いて記録を行ない、情報発生源から入力された画像形成データに基づいて画像パターンを生成し、前記画像パターンにしたがって前記吐出口からインクを吐出することにより前記被記録媒体に記録を行なう記録装置において、

前記画像パターンに基づき、前記被記録媒体毎に記録ドット数を計数する計数手段と、

前記計数された記録ドット数から、インク使用予定量を算出する算出手段と、

前記インク収容容器内のインク量を検知するインク量検知手段と、

前記算出手段により算出されたインク使用予定量と、前記インク量検知手段により検知されたインク量に基づき得られた、記録に実際に使用されたインク消費量とを比較し、記録画像の異常の有無を判断する判断手段と、

前記記録画像に異常があると判断されたときに、使用者に前記記録画像の異常を知らせる報知手段とを有することを特徴とする記録装置。

【請求項５】　被記録媒体に向けてインクを吐出するための吐出口が設けられた記録ヘッドと、前記記録ヘッドに供給されるインクを収容するインク収容容器とを用いて記録を行ない、情報発生源から入力された画像形成デ

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ータに基づいて画像パターンを生成し、前記画像パターンにしたがって前記吐出口からインクを吐出することにより前記被記録媒体に記録を行なう記録装置において、

前記画像パターンに基づき、前記被記録媒体毎に記録ドット数を計数する計数手段と、

前記計数された記録ドット数から、インク使用予定量を算出する算出手段と、

前記インク収容容器内のインク量を検知するインク量検知手段と、

前記算出手段により算出されたインク使用予定量と、前記インク量検知手段により検知されたインク量に基づき得られた、記録に実際に使用されたインク消費量との差を計算し、その値を保持する保持手段と、

前記記録ヘッドを清浄に保つための回復処理を行なう回復手段と、

前記インク使用予定量と前記インク消費量との比較により記録画像の異常の有無を判断し、異常がある場合には前記回復手段を作動させた後、前記保持手段に保持されたインク使用予定量とインク消費量との差から前記回復手段による回復処理の効果を判断し、効果があると判断されたときに再び画像記録を行なう判断手段とを有することを特徴とする記録装置。

【請求項６】　記録ヘッドは、インク吐出用の熱エネルギーを発生するための電気熱変換体を備えている請求項１乃至５のいずれか１項に記載の記録装置。

【請求項７】　記録ヘッドは、電気熱変換体によって印加される熱エネルギーにより、インクに生ずる状態変化を利用して吐出口よりインクを吐出させる請求項６に記載の記録装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、インクやトナー等の記録用部材を被記録媒体に付着させて記録を行なう記録装置に関する。

【０００２】

【従来の技術】従来、記録装置においては、被記録媒体に記録を行なうためのインクやトナー等の記録用部材を収納する記録用部材収納容器（以下、「カートリッジ」という）を記録装置本体に着脱自在に設け、記録にともない記録用部材がなくなったら、カートリッジを新規なものと交換するものがよく知られている。その際、カートリッジには様々な種類があり、装着されるカートリッジの種類によって記録装置本体の制御を変える必要がある。そこで、カートリッジの種類や特性等、カートリッジ固有の情報を記録装置本体へ提供する手段として、カートリッジの外形形状をカートリッジの種類毎に変えておき、カートリッジを記録装置本体に装着することで記録装置本体に設けられたマイクロスイッチ等を押下させることにより、これを実現させていた。

【０００３】また、カートリッジ内にレベルセンサを設

け、このレベルセンサからの情報を記録装置本体に出力することにより、カートリッジ内の記録用部材の残量情報を提供することも行なわれていた。

【０００４】一方、吐出口からインクを吐出することにより被記録媒体に記録を行なうインクジェット記録装置においては、吐出口の目詰まりや吐出口へのインクの供給不足等に起因して、部分的あるいは全体的にインクが吐出されなくなってしまう場合がある。そこで、通常のインクジェット記録装置では吐出口およびその周辺を清浄に保つための回復装置等を設け、上述した不具合が発生した場合には前記回復装置等による回復処理を行なっていた。

【０００５】【発明が解決しようとする課題】しかしながら、上述した、カートリッジの種類毎にカートリッジの形状を変えるものでは、多くの情報を提供するのが困難であった。また、カートリッジの形状により情報の内容が決まってしまうので恒久的な情報しか提供できないので、例えば記録用部材収容容器内の記録用部材の残量等、新たな任意の情報を持たせることもできないので、記録用部材の残量が少ないのに記録を行なってしまい記録の途中で記録用部材がなくなって記録品位が低下したり、記録用部材の残量が少ないと思って記録用部材収容容器を新規のものと交換したが実はまだ多量に残っており、資源の無駄が生じてしまうという問題点があった。さらに、カートリッジを再利用したときにも同じ情報しか持たせることができず、汎用性を持たせることができないという問題点もあった。

【０００６】また、カートリッジ内にレベルセンサを設けたものでは、レベルセンサによる測定結果が曖昧で測定毎に異なった値を検出したり、その機能上、水平な位置でしかも静止した状態でないと正確な測定ができず、不確かな情報が提供されてしまう。その結果、記録用部材の残量が少ないのにまだ多量にあると検出してしまい、記録の途中で記録用部材がなくなってしまったり、記録用部材の残りが少ないと検出されたので記録用部材収容容器を新規のものに交換したが、実はまだ多量に残っている場合が発生するおそれがあり、記録品位の低下や資源の無駄が生じてしまう場合があるという問題点があった。

【０００７】一方、インクジェット記録装置においては、吐出口の目詰まりや吐出口へのインクの供給不足に起因するインクの吐出不良についての情報は検出することができず、使用者が実際に出力された記録物を見て判断しているため、以下に示すような問題点があった。

【０００８】（１）吐出口の目詰まりが軽度の場合には、そのことによる不具合は記録された画像の一部にしか現われてこないため、記録された画像を一見しただけでは見つからないことがある。

【０００９】（２）カラー画像記録装置においては、記録された色が指定した色と異なっていた場合、色指定が誤っていたのか記録装置の異常なのかすぐには判断できない。

【００１０】（３）特に、複数枚の記録を連続して行なう場合には、記録の途中でインクの吐出不良が発生しても、使用者がそれに気がつかないと最後まで記録が行なわれ、その結果として多量の被記録媒体が無駄になってしまうことがある。

【００１１】本発明の目的は、カートリッジの種類や記録用部材の残量や記録品位等、記録に関する様々な情報を持ち、それを確実に検出することで記録品位を向上させ、さらには資源を無駄に消費しない記録装置を提供することにある。

【００１２】【課題を解決するための手段】上記目的を達成するため本発明は、被記録媒体に記録用部材を付着させて前記被記録媒体に記録を行なう記録ヘッドと、前記記録ヘッドに供給される前記記録用部材を収容するとともに記録装置本体に着脱自在に設けられた記録用部材収容容器とを用いて記録を行なう記録装置において、前記記録用部材収容容器が前記記録装置本体に装着されているときに、前記記録用部材収容容器に設けられた、任意の情報を一時的あるいは恒久的に記憶する記憶手段に、前記情報の読み出しおよび書き込みを行なうための制御手段を有することを特徴とする。

【００１３】また、被記録媒体に記録用部材を付着させて前記被記録媒体に文字の記録を行なう記録ヘッドと、前記記録ヘッドに供給される前記記録用部材を収容する記録部材収容容器とを用いて記録を行なう記録装置において、記録された文字数を計数し、前記計数結果に基づいて前記記録用部材収容容器内の記録用部材の残量情報を提供する計数手段を有することを特徴とするものや、被記録媒体に記録用部材を付着させて前記被記録媒体に記録を行なう記録ヘッドと、前記記録ヘッドに供給される前記記録用部材を収容する記録部材収容容器とを用いて記録を行なう記録装置において、記録されたドット数を計数し、前記計数結果に基づいて前記記録用部材収容容器内の記録用部材の残量情報を提供する計数手段を有することを特徴とするものであってもよい。

【００１４】さらに、被記録媒体に向けてインクを吐出するための吐出口が設けられた記録ヘッドと、前記記録ヘッドに供給されるインクを収容するインク収容容器とを用いて記録を行ない、情報発生源から入力された画像形成データに基づいて画像パターンを生成し、前記画像パターンにしたがって前記吐出口からインクを吐出することにより前記被記録媒体に記録を行なう記録装置において、前記画像パターンに基づき、前記被記録媒体毎に記録ドット数を計数する計数手段と、前記計数された記録ドット数から、インク使用予定量を算出する算出手段と、前記インク収容容器内のインク量を検知するインク

量検知手段と、前記算出手段により算出されたインク使用予定量と、前記インク量検知手段により検知されたインク量に基づき得られた、記録に実際に使用されたインク消費量とを比較し、記録画像の異常の有無を判断する判断手段と、前記記録画像に異常があると判断されたときに、使用者に前記記録画像の異常を知らせる報知手段とを有するものや、前記画像パターンに基づき、前記被記録媒体毎に記録ドット数を計数する計数手段と、前記計数された記録ドット数から、インク使用予定量を算出する算出手段と、前記インク収容容器内のインク量を検知するインク量検知手段と、前記算出手段により算出されたインク使用予定量と、前記インク量検知手段により検知されたインク量に基づき得られた、記録に実際に使用されたインク消費量との差を計算し、その値を保持する保持手段と、前記記録ヘッドを清浄に保つための回復処理を行なう回復手段と、前記インク使用予定量と前記インク消費量との比較により記録画像の異常の有無を判断し、異常がある場合には前記回復手段を作動させた後、前記保持手段に保持されたインク使用予定量とインク消費量との差から前記回復手段による回復処理の効果を判断し、効果があると判断されたときに再び画像記録を行なう判断手段とを有するものであってもよい。

【０００５】そして、上述した各発明において記録ヘッドは、インク吐出用の熱エネルギーを発生するための電気熱変換体を備えているものでもよく、さらに記録ヘッドは、電気熱変換体によって印加される熱エネルギーにより、インクに生ずる状態変化を利用して吐出口よりインクを吐出させるものであってもよい。

【０００６】

【作用】上記のとおり構成された請求項１に記載の発明では、記録用部材収容容器は、任意の情報を一時的あるいは恒久的に記憶する記憶手段を有し、記録用部材収容容器に関する情報はこの記憶手段に記憶される。これにより、記録用部材収容容器の形状を変えなくても記録用部材収容容器に任意の情報を持たせることができ、しかもこの情報量は、記録用部材収容容器の形状をかえた場合に比較して多いものとなる。また、記憶手段に記憶されている情報の内容を書き換えることで、記録用部材収容容器の汎用性も高まる。

【０００７】請求項２に記載の発明では、記録された文字数を計数し、前記計数結果に基づいて前記記録用部材収容容器内の記録用部材の残量情報を提供する計数手段を有することで、予め１文字当りの記録用部材の使用量を統計的に求めておけば、記録文字数を計数することで、記録により消費された記録用部材の使用量が求められる。一方、未使用の状態で記録用部材収容容器内に収容されている記録用部材の量（初期値）も予めわかっているので、前記初期値と前記使用量とを比較することで、記録用部材収容容器内の記録用部材の残量情報が得られる。

【０００８】請求項３に記載の発明においても請求項２に記載の発明と同様に、記録された印字数を計数することで、それに基づき記録用部材収容容器内の記録用部材の残量情報が得られる。

【０００９】請求項４に記載の発明では、画像形成データから画像パターンが生成されると、算出手段によりその画像パターンに基づいてインク使用予定量が算出されるとともに、インク量検知手段によりインク収容容器内のインク量が検出される。一方、画像記録が終了すると、再びインク量検知手段によりインク収容容器内のインク量が検出され、記録前のインク量から記録後のインク量を減算することで記録に実際に使用されたインク量が求められる。そして判断手段で、インク使用予定量と記録に実際に使用されたインク量とを比較し、記録に実際に使用されたインク量の値が、インク使用予定量からインク吐出量のばらつき等を考慮した補正値を減算した値以下の場合には、吐出口の目詰まりや吐出口へのインクの供給不足等によりインクが正常に吐出されていないと判断し、インクが正常に吐出されていないことが報知手段に表示される。これにより、記録が行なわれた被記録媒体の記録品位は、使用者が被記録媒体の記録状況を目視で判断しなくても記録装置により異常の有無の情報が提供され、使用者の見逃しもなくなる。

【００２０】

【実施例】次に、本発明の実施例について図面を参照して説明する。

【００２１】（第１実施例）図１は、本発明の記録装置の第１実施例の要部概略ブロック図である。図１に示すように、記録用部材収容容器としてのカートリッジ２には、記録用部材であるインクやトナーを収容する収容部（不図示）と、記憶手段としての不揮発性メモリ４と、不揮発性メモリ４への情報の読み書きを制御するためのカートリッジ制御部３とを有し、カートリッジ２は記録装置本体へ着脱自在に設けられている。不揮発性メモリ４は、シリアルデータ入出力型のメモリで、その記憶容量が１２８ｂｉｔのものである。カートリッジ制御部３と、記録装置本体のコントロールボード１とは、カートリッジ２を記録装置本体に装着したときに、互いにＲ／Ｗ、ＲＥＱ、ＤＲＹ、ＣＬＣ、ＤＡＴＡの各信号線で接続される。これから明らかなように、コントロールボード１およびカートリッジ制御部３によって、記憶手段に情報の読み出しおよび書き込みを行なうための制御手段が構成される。また、インクあるいはトナーを被記録媒体に付着させるための記録ヘッド（不図示）は、記録装置本体に備えられているものでもよいし、カートリッジ２に一体的に設けられているものでもよいが、いずれの場合でも、前記収容部内のインクあるいはトナーは接続管（不図示）を介して前記記録ヘッドに供給される構成となっている。

【００２２】図２は、データのリード、ライトプロセス

を示したタイミングチャートであり、同図の（A）はライトプロセスのタイミングチャート、同図の（B）はリードプロセスのタイミングチャートである。図2では、上述した各信号線で同期を取りながら、データを1ビットずつ転送する様子を示した。また、図2に示した各タイミングの条件は、ライトプロセスにおいては$t_{vc}<t_{v1}<t_{v2}<t_{v3}<t_{v4}<t_{v5}<t_{v6}$、$t_{v1}\fallingdotseq t_{v1}'$、$t_{v6}\fallingdotseq t_{v6}'\fallingdotseq t_{v6}''$であり、またリードプロセスにおいては$t_{r0}<t_{r1}<t_{r2}<t_{r3}<t_{r4}<t_{r5}<t_{r6}$、$t_{r2}=t_{r2}'$、$t_{r5}=t_{r5}'$である。

【0023】次に、不揮発性メモリ4（図1参照）へのデータの書き込み手順について、図2および図3を参照して説明する。ここでは各ステップ間の待ち時間を省略するが、使用するデバイスの特性により適宜な時間が設けられておりその動作が保証されているものとする。

【0024】まず、R／Wをリセットする（S301）。次にDATAラインに書き込みデータを乗せ、REQをセットする（S302）。そして、カートリッジ側制御回路3（図1参照）がRDYを返してくるのを判断し（S303）、その時にDRYがセットされていなければフォールトと判定してその旨を知らせてから終了する。RDYがセットされていれば、CLKをセット（S304）、さらにCLKをリセット（S305）してデータを転送する。このCLKのセット、リセットを受け取った後に、カートリッジ側制御回路3はRDYをリセットする。そして、RDYのリセットの確認をし（S306）、RDYがリセットされていなければフォールトと判定し、その旨を知らせて終了する。RDYがリセットされていれば正常に終了し、カートリッジ2の製品区分や製品番号、カートリッジ2の収容部内のインクあるいはトナーの残量等、任意の情報が不揮発性メモリ4（図1参照）に書き込まれる。

【0025】次に、不揮発性メモリからのデータの読み出し手順について、図2および図3を参照して説明する。ここでも図3の場合と同様に、各ステップ間には適宜な待ち時間が設けられていてその動作が保証されているものとする。

【0026】まず、R／Wをセットする（S401）。次にREQをセットする（S402）。REQがセットされるとカートリッジ側制御回路3（図1参照）によりRDYが返されるので、RDYがセットされたかを確認する（S403）。ここでRDYがセットされていなければフォールトと判定し、その旨を知らせて終了する。RDYがセットされているならば、CLKをセット（S404）、CLKをリセット（S405）し、不揮発性メモリ4（図1参照）に書き込まれているデータを読み出す。そしてRDYがリセットされているかを確認し（S406）、セットされたままならフォールトと判定し、その旨を知らせて終了する。RDYがリセットされていれば正常に終了する。

【0027】以上説明したように、カートリッジ2に不揮発性メモリ4を設け、さらにこの不揮発性メモリ4に情報を読み書きするためのコントロールボード1およびカートリッジ側制御部2を設けることで、カートリッジ2の種類や特性等、より多くの情報をカートリッジ2に持たせることができるとともに、この情報の書き換えも自由に行なえ、カートリッジ2の汎用性が高まる。ここで、記録ドット数を不揮発性メモリ4に随時記憶させることで、カートリッジ2内のインクあるいはトナーの残量を知ることもできる。また、カートリッジ2の種類を識別するために、カートリッジ2の種類毎にカートリッジ2の形状を変える必要もなくなるのでカートリッジ2の形状を1つに統一することができ、ひいてはカートリッジ2の低コスト化が可能となる。さらに、カートリッジ2が使用後にリサイクルされる場合でもカートリッジ2内の情報が自由に書き換えられるので、カートリッジ2の再生が容易となる。

【0028】（第2実施例）図5は、本発明の記録装置の第2実施例の概略ブロック図である。本実施例の記録装置は、例えばリストプリンタのような主に文字の印字のみを行なう記録装置であり、印字データを受信するインターフェイス11と、記録装置全体の制御を行なうCPU12と、CPU12が処理を行なうのに必要なプログラムが格納されるROM素子13と、CPU12が必要とする作業記憶域を提供するRAM素子14と、文字フォントを格納するフォントROM素子15と、被記録媒体に文字を印字する記録ヘッド（不図示）を備えた印字部16と、印字文字数等を記憶するための不揮発性メモリ17とが、それぞれデータバスで接続されている。RAM素子14には、印字文字数を計数するための一時作業域である文字数カウント領域14aが確保されており、文字数カウント領域14aで計数された印字文字数は、印字の都度不揮発性メモリ17に記憶される。また、不揮発性メモリ17は、記録装置本体に着脱自在に設けられる記録用部材収容容器としてのカートリッジ（不図示）が、記録装置本体に装着される度に記憶内容がクリアされるものである。すなわち不揮発性メモリ17には、カートリッジが記録装置本体に装着された時点からの累積印字文字数が記憶され、RAM素子14および不揮発性メモリ17によって、記録された文字数を計数し、計数結果に基づいて記録用部材収容容器内の記録用部材の残量情報を提供する計数手段を構成する。

【0029】ここで、前記カートリッジが未使用のときに前記カートリッジに収容されている記録用部材としてのインクの量をFV［cm^3］、また、予め一文字当りの平均的なインク消費量を統計的に求めておき、その値をCV［cm^3／文字］とすると、前記カートリッジ内のインクが完全に消費されるための印字文字数nは、印字文字数nとインク消費量とが比例することからn＝FV／CV［文字］で与えられる。このnの値を小数点以

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下で切り捨てた値Nを、インク切れの警告を発するための規定値Nとする。

【0030】次に、本記録装置の動作について、図6に示したフローチャートを参照しつつ説明する。まず、記録装置に電源が投入されると、記録装置自身の初期化処理が行なわれる（S601）。このときに文字数カウント領域14aがクリアされ、その値はゼロとなる。次に、印字文字データを受信するまで待機状態となる（S602、S603）。印字文字データを受信すると、受信したデータの解析を行なう（S604）。そして、解析したデータを印字部16に送り、印字を行なう（S605）。このとき、一文字印字する毎に文字数カウント領域14aをインクリメントしていく。データの印字が全て終了したら、不揮発性メモリ17に記録されている値を読み出す。不揮発性メモリ17にはこのカートリッジで前回まで行なった印字文字数が記憶されており、今回初めてこのカートリッジで印字を行なった場合には、不揮発性メモリ17に記憶されている値はゼロである。この値に文字数カウント領域14aの値を加算して再び不揮発性メモリ17に記録することで、印字文字数の累計をカウントする（S606）。次に、文字数カウント領域14aをクリアし（S607）、その値をゼロにする。そして、S606で求められた累計印字文字数と前述した規定値Nの値とを比較し（S608）、インク切れかどうかを判断する。すなわち、累計印字文字数が規定値Nを越えた場合にはインク切れと判断し、インク切れ警告を行なった（S609）後で、再びデータの待機状態となる。印字文字数の累計が規定値Nを下回っている場合にはインクがまだあると判断し、再びデータの待機状態となる。

【0031】以上説明したように本実施例では、レベルセンサ等を用いずに、印字文字数を計数することによりカートリッジ内のインク残量情報を得ているので、安定した精度でインク残量を検出することができる。また、カートリッジにレベルセンサ等を設ける必要がなくなることにより、カートリッジの低コスト化が図れるとともに、カートリッジを廃棄した際にもレベルセンサ等を同時に廃棄しなくてすむので資源の無駄がなくなる。

【0032】（第3実施例）図7は、本発明の記録装置の第3実施例の概略ブロック図である。本実施例の記録装置はラインスキャン型のレーザビームプリンタであり、図7に示すように、受信データを解析するデータ解析部21と、データ解析部21で解析されたデータのイメージ展開を行なうドットイメージ形成ブロック22と、ドットイメージ形成ブロック22で展開されたイメージデータを受け取ってビデオ信号を生成するビデオインターフェイス回路23と、ビデオインターフェイス回路23で生成されたビデオ信号に基づいて被記録媒体に記録を行なう記録ヘッド（不図示）を備えたプリンタ機構部24と、ビデオインターフェイス回路23で生成されたビデオ信号のパルス信号を計数するカウンタ回路25と、カウンタ回路25の値を加算して記憶していく不揮発性メモリ26とから構成される。ここで、不揮発性メモリ26は、記録装置本体に着脱自在に設けられる記録用部材収容容器としてのカートリッジ（不図示）が、記録装置に装着される度にその記憶内容がクリアされるものである。すなわち不揮発性メモリ26には、カートリッジが記録装置本体に装着された時点からの累積記録ドット数が記憶され、カウンタ回路25および不揮発性メモリ26によって、記録されたドット数を計数し、計数結果に基づいて記録用部材収容容器内の記録用部材の残量情報を提供する計数手段を構成する。また、1つのドットを印字するのに必要なインク消費量は予め計測等により求められており、ここでは前記カートリッジ内のインクを全て消費するための総ドット数を、規定値CVとする。

【0033】次に、本記録装置の動作について、図8に示したフローチャートを参照しつつ説明する。まず、記録装置に電源が投入されると、記録装置自身の初期化処理が行なわれる（S801）。このときにカウンタ回路25がリセットされ、その値はゼロとなる。次に、印字文字データを受信するまで待機状態となる（S802、S803）。印字文字データを受信すると、データ解析部21で、受信したデータの解析を行なう（S804）。そして、解析したデータを、ドットイメージ形成ブロック22でイメージデータへ展開し（S805）、さらにこのイメージデータをプリンタ機構部24に送り、印字を行なう（S806）。このとき、カウンタ回路25はビデオインターフェイス回路23からのパルス信号をカウントし、印字データのドット数を記録している。印字が終了したら、不揮発性メモリ26に、カウンタ回路25でカウントしたドット数を加算し、このカートリッジでの総ドット数を求める。ここで、この印字の前にも同じカートリッジで印字が行なわれている場合には、不揮発性メモリ26には、この印字の前の印字までの総ドット数が記憶されており、印字出力毎にカウンタ回路25でカウントしたドット数を加算してその値を更新することで、同じカートリッジでの総ドット数が求められる。そして、S807で求められた総ドット数と前述した規定値CVの値とを比較し（S808）、インク切れかどうかを判断する。すなわち、総ドット数が規定値CVを越えた場合にはインク切れと判断し、インク切れ警告を行なった（S809）後で、カウンタ回路25の値をリセットしてゼロとし（S810）、再びデータの待機状態となる。総ドット数が規定値CVを下回っている場合にはインクがまだあると判断し、そのままカウンタ回路25をリセットし（S810）、再びデータの待機状態となる。

【0034】本実施例においても、総ドット数を計数してカートリッジ内のインク残量情報を得ることにより、

第２実施例と同様の効果が得られる。

【００３５】（第４実施例）図９は、本発明の記録装置の第４実施例の概略ブロック図である。本実施例の記録装置は、イエロー、マゼンタ、シアン、ブラックの４色のインクを用いてカラー画像を記録するカラー画像記録装置であり、そのカラー画像記録装置本体５１には、後述するプログラムＲＯＭ５５内に格納されているプログラムに従い、このカラー画像記録装置全体の制御を行なうＣＰＵ５３を有する。受信バッファ５４は、ホストコンピュータ５２により送られてくるカラー画像データを一時的に格納した後、ＣＰＵ５３に送るものである。判断手段としてのプログラムＲＯＭ５５は、ＣＰＵ５３がカラー画像記録装置の制御を行なうためのものであり、図１０に示すアルゴリズムをもつプログラムが格納されている。フレームバッファ５６は、各インク色毎に生成された２値の画像パターンを保持するメモリであり、各インク色毎に４つのバッファ５６ａ、５６ｂ、５６ｃ、５６ｄを有する。記録ヘッド（不図示）を備えたカラー画像出力部５８は、各インク色毎にそれぞれ複数個ずつの吐出口（不図示）を有し、フレームバッファ５６内の各インク色毎の画像パターンに従い前記吐出口からインクを吐出することにより、被記録媒体に記録を行うものである。インク量検知手段としてのインク残量検出部５７は、各色のインクを収容するための、各インク色毎の４つのインク収容容器（不図示）にそれぞれ設けられているものであり、各インク色毎のインクの残量を検出し、その値をＣＰＵ５３に送ることができるようになっている。各インク収容容器内のインクは、それぞれインク供給経路（不図示）を介して、カラー画像出力部５８の各インク色に対応した各吐出口に供給される。算出手段としてのドットカウンタ部５９は、ホストコンピュータ５２より送られたカラー画像データを処理して生成され、フレームバッファ５６に保持されている各色毎の２値の画像パターン内で、記録すべきドット数をカウントした値を保持するメモリであり、各色毎の４つのドットカウンタ５９ａ、５９ｂ、５９ｃ、５９ｄが設けられている。インク消費量保持領域６０は、１枚の被記録媒体に記録を行なったときに消費されたインク量を計算して保持しておくもので、ドットカウンタ部５９と同様に、各色毎の４つのインク消費量保持領域６０ａ、６０ｂ、６０ｃ、６０ｄが設けられている。ワーク領域６１は、ワーク領域として使用されるメモリであり、このメモリを使用して、画像データから２値の画像パターンを生成したり、インクの使用予定量の計算等の様々な処理が行なわれる。そして、このカラー画像記録装置の異常の有無等は、報知手段としてのメッセージ表示部６２に表示される。次に、本実施例の画像記録動作および被記録媒体の排紙動作について、図１０を参照しつつ説明する。

図１０は、図９に示した記録装置での、排紙処理の手順を示すフローチャートであり、プログラムＲＯＭ５５に格納されているプログラムのうちの排紙命令に対する処理の部分を示したものである。なお、本実施例のカラー画像記録装置は、ホストコンピュータ５２からカラー画像データを受け取り、その中に含まれる各種コマンドを解釈、実行しながら、カラーの２値画像パターンを生成するものであるが、２値画像パターンの生成等の処理は公知の処理でよく、直接本発明に係るものではないので、ここではその説明は省略する。

【００３６】図１０に示した処理は、ホストコンピュータ５２から送られてきたカラー画像データ中の排紙命令を認識した時点で開始され、まず、フレームバッファ５６内の各色の２値パターン毎に、記録すべきドットの数をカウントし、ドットカウンタ部５９の各色に対応したドットカウンタ５９ａ、５９ｂ、５９ｃ、５９ｄにそれぞれその値をセットする（Ｓ１００１）。次に、カウントしたドット数から、フレームバッファ５６内の画像を記録するのに必要なインクの使用予定量を各色毎に計算し、ワーク領域６１内に保持しておく（Ｓ１００２）。ここで、インクの使用予定量は、１ドット当りのインク消費量に記録ドット数を乗じた値で示され、１ドット当りのインク消費量は、予めプログラムＲＯＭ５５内に保持されている。次に、インク残量検出部５７により画像記録前のインク残量を各色毎に検出し、各色毎のインク残量を、それぞれインク使用量保持領域６０の各色に対応した保持領域６０ａ、６０ｂ、６０ｃ、６０ｄ内に格納しておく（Ｓ１００３）。そして、フレームバッファ５６内に保持されている各色の２値画像パターンに従ってカラー画像出力部５８により被記録媒体に画像を記録しながら、被記録媒体を排紙していく（Ｓ１００４）。

【００３７】フレームバッファ５６内の画像パターンを全て記録したら、再びインク残量検出部５７より各色毎のインク残量を読み込んで、その値を、それぞれインク消費量保持領域６０の各保持領域６０ａ、６０ｂ、６０ｃ、６０ｄ内に格納されている値から減算する（Ｓ１００５）。これにより、インク消費量保持領域６０には、画像を記録した際に実際に消費されたインク消費量が各色毎に保持されたことになる。次に、実際に消費されたインク消費量と、ワーク領域６１内に保持されているインク使用予定量とに基づき、吐出口の目詰まり等により記録した画像がかすれていないかどうかを判断する（Ｓ１００６）。すなわち、実際のインク消費量とインク使用予定量との間に、（実際のインク消費量）≧（インク使用予定量）－（消費量許容値）の式で表わされる関係が成立する場合には、インクは予定通り吐出されていると考えられ、したがって、画像も正しく記録されているとみなすことができる。ここで、上式中の消費量許容値とは、インク残量検出部５７での検出誤差や、１ドット当りのインクの吐出量のばらつき等を考慮した補正値であり、この値は予めプログラムＲＯＭ５５内に格納されている。一方、上式の関係が成立しない場合には、イン

クが正常に吐出されなかったと考えられ、記録された画像にはかすれや色調不良等の異常が生じているとみなすことができる。

【００３８】上式の関係に基づいて、異常がなく正常に記録されたと判断された場合には、そのまま排紙処理を終了する。一方、異常があると判断された場合には、メッセージ表示部６２に警告メッセージを表示して（Ｓ１００７）排紙処理を終了する。

【００３９】以上説明したように、１ページの画像の記録時において、実際のインク消費量をもとに、吐出口の目詰まりや吐出口へのインクの供給不足によるかすれ等の異常がないかどうかを記録装置自身で判断し、異常が発見された場合には速やかに使用者に警告することが可能となる。これにより、使用者の目視判断によらずに画像の異常を検出することができるので、前記異常をより確実に発見することができる。また、出力された色調が指定したものと異なる場合は、メッセージ表示部６２に警告メッセージが表示されればインクの吐出異常であるが、警告メッセージが表示されないときには色指定の誤りが原因であるといえるので、直ちに色指定の誤りを修正し、正しい色調の画像を記録することができる。

【００４０】本実施例では、カラー画像を記録するために用いるインクが、イエロー、マゼンタ、シアン、ブラックの４色のものの例を示したが、それに限らずイエロー、、マゼンタシアンの３色のみを用いたり、他の色のインクを用いるものでもよく、本発明はカラー画像記録装置のもつインクの色に限定されるものではない。また、フレームバッファ５６内の２値画像パターンの１画素（１ビット）が実際に記録される画像の１ドットに対応することを前提としたものであったが、本発明はフレームバッファ５６内の２値画像パターンの１画素に対応する記録画像のドット数に限定されるものではなく、２値画像パターンの１画素が記録画素の複数ドットに対応するものであってもよい。

【００４１】（第５実施例）図１１は、本発明の記録装置の第５実施例の概略ブロック図である。本実施例の記録装置も第４実施例のものと同様に、ホストコンピュータ７２から画像データを受け取り、その画像データから、イエロー、マゼンタ、シアン、ブラックの４色毎の２値画像パターンを生成し、この４色の画像パターンを被記録媒体上に重ねて記録を行なうものであり、カラー画像記録装置本体７１に設けられた、ＣＰＵ７３、受信バッファ７４、フレームバッファ７６、インク残量検出部７７、カラー画像出力部７８、ドットカウンタ部７９、インク消費量保持領域８０およびワーク領域８１は、それぞれ第４実施例のものと同様ですのでその説明は省略する。

【００４２】本実施例で第４実施例のものと異なっているのは、判断手段としてのプログラムＲＯＭ７５に格納されているプログラムの内容、および保持手段としての回復指数保持領域８２と回復手段としての回復装置（不図示）とが設けられている点である。プログラムＲＯＭ７５に格納されているプログラムは図１２に示すアルゴリズムを有し、その詳細については後述する。回復指数保持領域８２は、回復装置によりもう１度回復処理を行なうことで記録画像品位の向上が見込めるかどうかを判断するために用いられる回復指数を保持しておくものである。また、前記回復装置は、カラー画像出力部７８の吐出口に目詰まり等が生じた場合に、適宜の吸引手段によるインク吸引もしくはインクジェット記録ヘッドへのインク供給経路に設けた蓋室の加圧手段によるインク圧送を行ない、インクを吐出口より強制的に排出させて吐出口内の増粘インクを除去する等のヘッド回復処理を行なうものである。

【００４３】次に、本実施例の画像記録動作および被記録媒体の排紙動作について、図１２を参照しつつ説明する。図１２は、図１１に示した記録装置での、排紙処理の手順を示すフローチャートであり、プログラムＲＯＭ７５に格納されているプログラムのうちの排紙命令に対する処理の部分を示したものである。

【００４４】図１２に示した処理は、ホストコンピュータ７２から送られてきたカラー画像データ中の排紙命令を認識した時点で開始され、まず、フレームバッファ７６内の各色の２値パターン毎に、記録すべきドットの数をカウントし、ドットカウンタ部７９の各色に対応したドットカウンタ７９ａ、７９ｂ、７９ｃ、７９ｄにそれぞれその値をセットする（Ｓ１２０１）。次に、回復指数領域８２中の回復指数の値を初期化する（Ｓ１２０２）。このときの初期値としては、これから画像を記録するページの全面を、４色を重ねて記録するときに必要となるインクの量の値を用いておく。次に、カウントしたドット数から、フレームバッファ７６内の画像を記録するのに必要なインクの使用予定量を各色毎に計算し、ワーク領域８１内に保持しておく（Ｓ１２０３）。ここで、インクの使用予定量は、１ドット当りのインク消費量に記録ドット数を乗じた値で示され、１ドット当りのインク消費量は、予めプログラムＲＯＭ７５内に保持されている。次に、インク残量検出部７７により画像記録前のインク残量を各色毎に検出し、各色毎のインク残量を、それぞれインク使用量保持領域８０の各色に対応した保持領域８０ａ、８０ｂ、８０ｃ、８０ｄ内に格納しておく（Ｓ１２０４）。そして、フレームバッファ７６内に保持されている各色の２値画像パターンに従ってカラー画像出力部７８により被記録媒体に画像を記録しながら、被記録媒体を排紙していく（Ｓ１２０５）。

【００４５】フレームバッファ７６内の画像パターンを全て記録したら、再びインク残量検出部７７より各色毎のインク残量を読み込んで、その値を、それぞれインク消費量保持領域８０の各保持領域８０ａ、８０ｂ、８０ｃ、８０ｄ内に格納されている値から減算する（Ｓ１２

０６）。これにより、インク消費量保持領域８０には、画像を記録した際に実際に消費されたインク消費量が各色毎に保持されたことになる。次に、実際に消費されたインク消費量と、ワーク領域８１内に保持されているインク使用予定量とに基づき、第４実施例と同様にして、吐出口の目詰まり等により記録した画像がかすれる等の異常がないかどうかを判断する（Ｓ１２０７）。

【００４６】ここで、画像の異常がないと判断され他場合には、そのまま排紙処理を終了し、画像の異常があると判断された場合には回復の見込みがあるかどうかを判断する（Ｓ１２０８）。ここでは、その時点で回復指数保持領域８２に保持されている値と、先に算出されている各色毎のインクの使用予定量と実際の消費量との差の合計値とを比較する。すなわち、各色毎の、インクの使用予定量から実際の消費量を減算した値をそれぞれE_f、E_w、E_c、E_kとしたとき、（回復指数保持領域の値）＞$E_f+E_w+E_c+E_k+E_z$の条件式を満たすかどうかを判断する。この条件式中E_zは、インク残量検出部７７での検出誤差や、１ドット当りのインクの吐出量のばらつきを考慮した補正値で、予めプログラムＲＯＭ７５内に保持された定数値である。

【００４７】ここで上記条件式が満たされなかった場合には、回復処理を行なっても回復の見込みがないと判断され、そのまま排紙処理を終了する。一方、上記条件式が満たされた場合には回復の見込みがあると判断され、回復指数保持領域の値を（$E_f+E_w+E_c+E_k$）の値に書き換えた後、カラー画像出力部７８の回復処理を行なう（Ｓ１２０９）。そして、カラー画像出力部７８の回復処理を行なったら、再びインク残量検出部７７にて各色毎にインク残量を検出し（Ｓ１２０４）、画像記録をやり直す。

【００４８】以上説明した、回復の見込みがあるかどうかの判断では、１回目の判断時には回復指数保持領域８２に保持されている初期値との比較により判断されるが、この初期値は、上述したように非常に大きな値であるので、上記条件式は必ず満たされる。このため１回目の画像記録後に、インクの使用予定量と実際の消費量との差から画像にかすれ等の異常があると判断された場合には、必ず１度は回復処理を行ない、再度画像記録を行なうように作動する。その後、２回目以降の判断時には、回復指数保持領域８２の値は、前回の回復処理を行なう前のインクの使用量と実際の消費量との差の４色の合計値となるため、上記条件式により前回の回復処理の効果を判断することができることになる。すなわち、上記条件式が満たされるかどうかで回復の見込みがあるかないかを判断するということは、前回行なった回復処理が有効であったかどうかを判断して、有効であった場合にはもう１度回復処理を行なってカラー画像出力部７８の回復を図り、一方、有効でなかった場合には無駄な回復動作は行なわないということを意味している。

【００４９】以上説明したように、１ページの画像の記録時において、インク消費量をもとに画像のかすれ等の異常を検出するとともに、画像の異常が検出された場合には効果のある限り自動的に回復処理をして画像を記録し直すことができ、使用者はその都度回復装置を作動させる必要がなくなる。また、回復処理を行なうとともにその回復処理が有効であったかどうかも判断しているので、回復処理が有効でなかった場合には次の回復処理および記録を行なわず、被記録部材やインクが無駄に消費されることもない。

【００５０】また、本実施例においても第４実施例と同様に、インクの色は特に制限されるものではなく、また、２値画像パターンの１画素が記録画像の複数ドットに対応するものであってもよい。

【００５１】本発明は、特に記録装置の中でも熱エネルギーを利用して飛翔的液滴を形成し、記録を行うインクジェット方式の記録装置において、優れた効果をもたらすものである。

【００５２】その代表的な構成や原理については、例えば、米国特許第４７２３１２９号明細書、同第４７４０７９６号明細書に開示されている基本的な原理を用いて行うものが好ましい。この方式はいわゆるオンデマンド型、コンティニュアス型のいずれにも適用可能であるが、特に、オンデマンド型の場合には、液体（インク）が保持されているシートや液路に対応して配置されている電気熱変換体に、記録情報に対応していて核沸騰を越える急速な温度上昇を与える少なくとも一つの駆動信号を印加することによって、電気熱変換体に熱エネルギーを発生せしめ、記録ヘッドの熱作用面に膜沸騰をひじさせて、結果的にこの駆動信号に一対一で対応した液体（インク）内の気泡を形成できるので有効である。この気泡の成長、収縮により吐出用開口を介して液体（インク）を吐出させて、少なくとも一つの滴を形成する。この駆動信号をパルス形状とすると、即時適切に気泡の成長収縮が行なわれるので、特に応答性に優れた液体（インク）の吐出が達成でき、より好ましい。

【００５３】このパルス形状の駆動信号としては、米国特許第４４６３３５９号明細書、同第４３４５２６２号明細書に記載されているようなものが適している。なお、上記熱作用面の温度上昇率に関する発明の米国特許第４３１３１２４号明細書に記載されている条件を採用すると、更に優れた記録を行なうことができる。

【００５４】記録ヘッドの構成としては、上述の各明細書に開示されているような吐出口、液路、電気熱変換体の組み合わせ構成（直線状液流路または直角液流路）の他に、熱作用部が屈曲する領域に配置されている構成を開示する米国特許第４５５８３３３号明細書、米国特許第４４５９６００号明細書を用いた構成も本発明に含まれるものである。

【００５５】加えて、複数の電気熱変換体に対して、共

通するスリットを電気熱変換体の吐出部とする構成を開示する特開昭59－123670号公報や熱エネルギーの圧力波を吸収する開孔を吐出部に対応させる構成を開示する特開昭59－138461号公報に基づいた構成としても本発明は有効である。

【0056】さらに、記録装置が記録できる最大記録媒体の幅に対応した長さを有するフルラインタイプの記録ヘッドとしては、上述した明細書に開示されているような複数個の記録ヘッドの組み合わせによってその長さを満たす構成や、一体的に形成された1個の記録ヘッドとしての構成のいずれでもよいが、本発明は、上述した効果を一層有効に発揮することができる。

【0057】加えて、装置本体に装着されることで、装置本体との電気的な接続や装置本体からのインクの供給が可能になる交換自在のチップタイプの記録ヘッド、あるいは記録ヘッド自体に一体的にインクタンクが設けられたカートリッジタイプの記録ヘッドを用いた場合にも本発明は有効である。

【0058】また、本発明の記録装置の構成として設けられる、記録ヘッドに対しての回復手段、予備的な補助手段等を付加することは本発明の効果を一層安定できるので好ましいものである。これらを具体的に挙げれば、記録ヘッドに対してのキャッピング手段、クリーニング手段、加圧あるいは吸引手段、電気熱変換体あるいはこれとは別の加熱素子あるいはこれらの組み合わせによる予備加熱手段、記録とは別の吐出を行う予備吐出モードを行うことも安定した記録を行うために有効である。

【0059】さらに、記録装置の記録モードとしては黒色等の主流色のみの記録モードだけではなく、記録ヘッドを一体的に構成するか複数個の組み合わせによってでもよいが、異なる色の複色カラー、または混色によるフルカラーの少なくとも一つを備えた装置にも本発明は極めて有効である。

【0060】以上説明した本発明実施例においては、インクを液体として説明しているが、室温やそれ以下で固化するインクであって、室温で軟化するもの、もしくは液体であるもの、あるいは上述のインクジェット方式ではインク自体を30℃以上70℃以下の範囲内で温度調整を行ってインクの粘性を安定吐出範囲にあるように温度制御するものが一般的であるから、使用記録信号付与時にインクが液状をなすものであれば良い。

【0061】加えて、積極的に熱エネルギーによる昇温をインクの固形状態から液体状態への状態変化のエネルギーとして使用せしめることで防止するか、またはインクの蒸発防止を目的として放置状態で固化するインクを用いるかして、いずれにしても熱エネルギーの記録信号に応じた付与によってインクが液化し、液状インクとして吐出するものや、記録媒体に到達する時点では既に固化し始めるもの等のような、熱エネルギーによって初めて液化する性質のインクの使用も本発明には適用可能である。このような場合インクは、特開昭54－56847号公報あるいは特開昭60－71260号公報に記載されるような、多孔質シート凹部または貫通孔に液状または固形物として保持された状態で、電気熱変換体に対して対向するような形態としても良い。本発明においては、上述した各インクに対して最も有効なものは、上述した膜沸騰方式を実行するものである。

【0062】さらに加えて、本発明に係る記録装置の形態としては、ワードプロセッサやコンピュータ等の情報処理機器の画像出力端末として一体または別体に設けられるものの他、リーダと組み合させた複写装置、さらには送受信機能を有するファクシミリ装置の形態を採るものであってもよい。

【0063】

【発明の効果】本発明は以上説明したとおり構成されているので、以下に記載する効果を奏する。

【0064】請求項1に記載の発明では、記録用部材収容容器に記憶手段を設け、さらに、記憶手段に情報を読み書きするための制御手段を設けることで、記録用部材収容容器にはより多くの任意の情報を持たせることができるとともに、その情報の書き換えも自由に行なうことができ、記録用部材収容容器の汎用性を高めることができる。また、記録用部材収容容器を識別するために従来のように記録用部材収容容器の形状を変えることも必要なくなるので、記録用部材収容容器の形状を統一することができ、ひいては低コスト化を図ることができる。さらに、記憶手段に記憶されている情報を自由に書き換えることにより、記録用部材収容容器の再利用も容易になる。

【0065】請求項2に記載の発明では、記録された文字数を計数し、前記計数結果に基づいて前記記録用部材収容容器内の記録用部材の残量情報を提供する計数手段を有することで、記録用部材収容容器内にレベルセンサを設けなくても、記録文字数を計数することで記録用部材の残量を検出でき、より正確な残量情報を得ることができる。また、レベルセンサを設けなくてもよいので記録用部材収容容器の低コスト化が図れ、さらには記録用部材収容容器を廃棄する際にも資源の無駄をなくすることができる。そして、計数手段を、記録されたドット数を計数するものとしても同様の効果が得られる。

【0066】請求項4に記載の発明では、インク使用予定量を算出する算出手段と、インク収容容器内のインク量を検知するインク量検知手段と、インク使用予定量と記録に実際に使用されたインク消費量とを比較し、吐出口の目詰まりや吐出口へのインクの供給の不具合による記録画像の異常の有無を判断する判断手段とを有し、異常があった場合にはそのことを報知手段に表示させることで、使用者が目視で確認しなくても前記異常を記録装置自身によって自動的に判断することが可能となるので、使用者の前記異常の見落としもなく、前記異常を確

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実に発見することができる。

【００６７】請求項５に記載の発明では、上述した効果に加え、吐出口の目詰まりや吐出口へのインクの供給の不具合による記録画像の異常が検出された際に、保持手段で計算されたインク使用予定量と実際のインク消費量との差に基づき、回復の見込みがある限り回復手段で回復処理を行ない、再度画像記録をし直すことを繰り返すことにより、使用者が回復手段を作動させなくても、記録ヘッドが回復するまでの都度自動的に回復処理がなされ、最終的には正しく記録された画像を得ることができる。また、判断手段では回復処理が有効であったかどうかの判断も行なっているので、回復処理が有効でなかった場合には次の回復処理および記録を行なわず、被記録媒体やインクが無駄に消費されることもない。

【図面の簡単な説明】

【図１】本発明の記録装置の第１実施例の要部概略ブロック図である。

【図２】図１に示した記録装置でのデータのリード、ライトプロセスを示したタイミングチャートであり、同図の（Ａ）はライトプロセスのタイミングチャート、同図の（Ｂ）はリードプロセスのタイミングチャートである。

【図３】図１に示したカートリッジへのデータの書き込み手順を示すフローチャートである。

【図４】図１に示したカートリッジからのデータの読み込み手順を示すフローチャートである。

【図５】本発明の記録装置の第２実施例の概略ブロック図である。

【図６】図５に示した記録装置の全体の動作を示す概略フローチャートである。

【図７】本発明の記録装置の第３実施例の概略ブロック図である。

【図８】図７に示した記録装置の全体の動作を示す概略フローチャートである。

【図９】本発明の記録装置の第４実施例の概略ブロック図である。

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【図１０】図９に示した記録装置での、排紙処理の手順を示すフローチャートである。

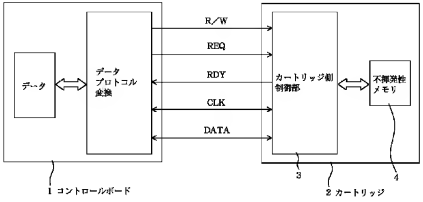
【図１１】本発明の記録装置の第５実施例の概略ブロック図である。

【図１２】図１１に示した記録装置での、排紙処理の手順を示すフローチャートである。

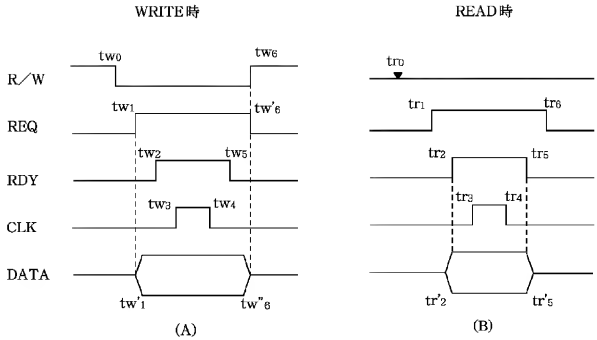
【符号の説明】

１　　コントロールボード
２　　カートリッジ
３　　カートリッジ側制御部
４、１７、２６　　不揮発性メモリ
１１　　インターフェイス
１２、５３、７３　　ＣＰＵ
１３　　ＲＯＭ素子
１４　　ＲＡＭ素子
１４ａ　　文字数カウント領域
１５　　フォントＲＯＭ素子
１６　　印字部
２１　　データ解析部
２２　　ドットイメージ形成ブロック
２３　　ビデオインターフェイス回路
２４　　プリンタ機構部
２５　　カウンタ回路
５１、７１　　カラー画像記録装置本体
５２、７２　　ホストコンピュータ
５４、７４　　受信バッファ
５５、７５　　プログラムＲＯＭ
５６、７６　　フレームバッファ
５７、７７　　インク残量検出部
５８、７８　　カラー画像出力部
５９、７９　　ドットカウンタ部
６０、８０　　インク消費量保持領域
６１、８１　　ワーク領域
６２　　メッセージ表示部
８２　　回復指数保持領域

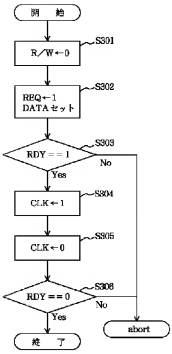
【図１】



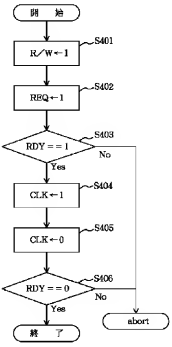
【図２】


WRITE時
READ時
R／W
REQ
RDY
CLK
DATA
tw0
tw6
tw1
tw'6
tw2
tw5
tw3
tw4
tw'1
tw"6
(A)
tr0
tr1
tr6
tr2
tr5
tr3
tr4
tr'2
tr'5
(B)

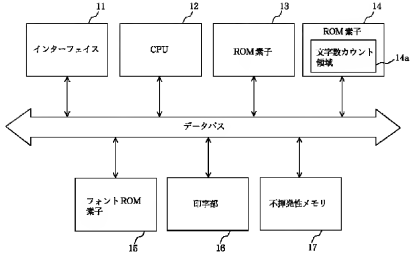
【図３】


開　始
R／W←0
S301
REQ←1
DATAセット
S302
RDY＝＝1
S303
No
Yes
CLK←1
S304
CLK←0
S305
RDY＝＝0
S306
No
Yes
abort
終　了

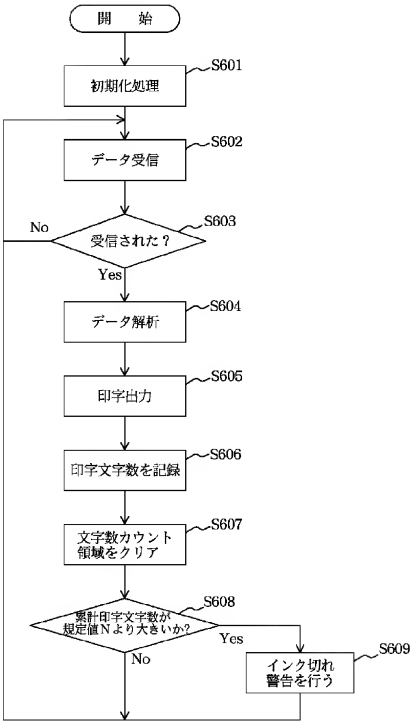
【図４】


開　始
R／W←1
S401
REQ←1
S402
RDY＝＝1
S403
No
Yes
CLK←1
S404
CLK←0
S405
RDY＝＝0
S406
No
Yes
abort
終　了

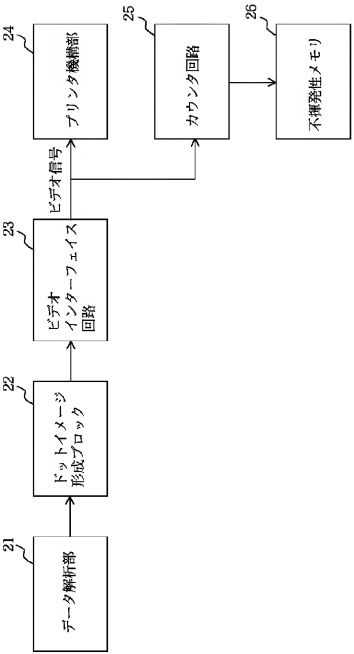
【図５】


11
12
13
14
インターフェイス
CPU
ROM素子
ROM素子
文字数カウント領域
14a
データバス
フォントROM素子
印字部
不揮発性メモリ
15
16
17

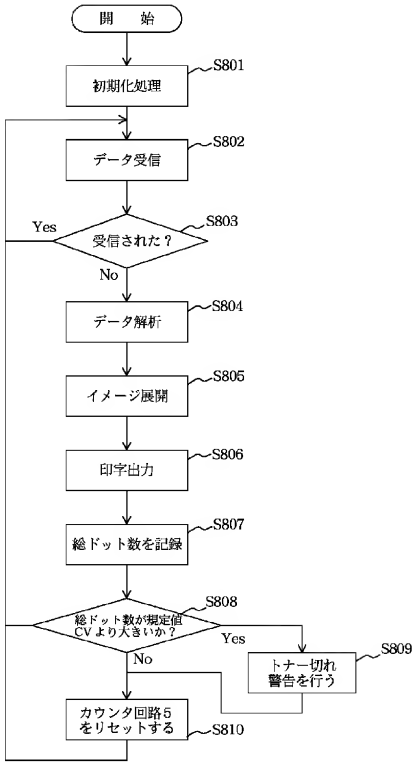
【図６】


開　始
S601
初期化処理
S602
データ受信
No
S603
受信された？
Yes
S604
データ解析
S605
印字出力
S606
印字文字数を記録
S607
文字数カウント
領域をクリア
S608
累計印字文字数が
規定値Ｎより大きいか?
Yes
No
S609
インク切れ
警告を行う

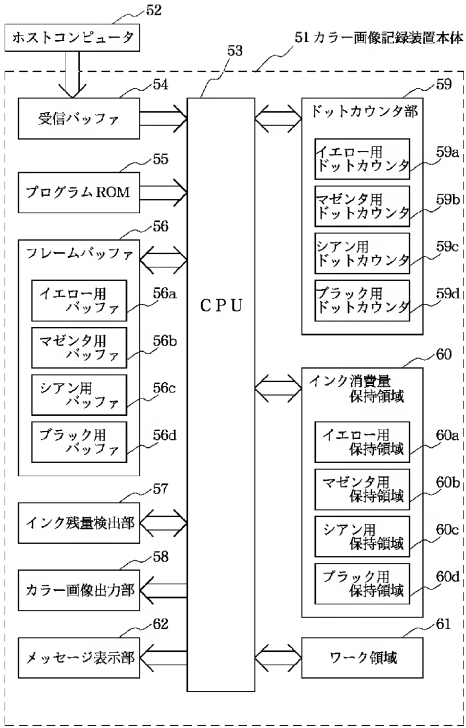
【図７】


21
データ解析部
22
ドットイメージ形成ブロック
23
ビデオインターフェイス回路
ビデオ信号
24
プリンタ機構部
25
カウンタ回路
26
不揮発性メモリ

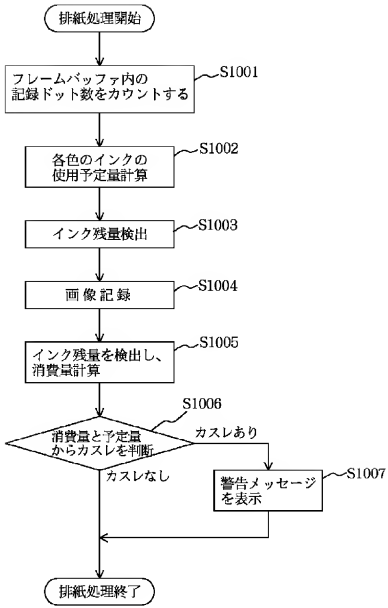
【図８】


開　始
S801
初期化処理
S802
データ受信
S803
Yes
受信された？
No
S804
データ解析
S805
イメージ展開
S806
印字出力
S807
総ドット数を記録
S808
総ドット数が規定値CVより大きいか？
Yes
S809
トナー切れ警告を行う
No
S810
カウンタ回路５をリセットする

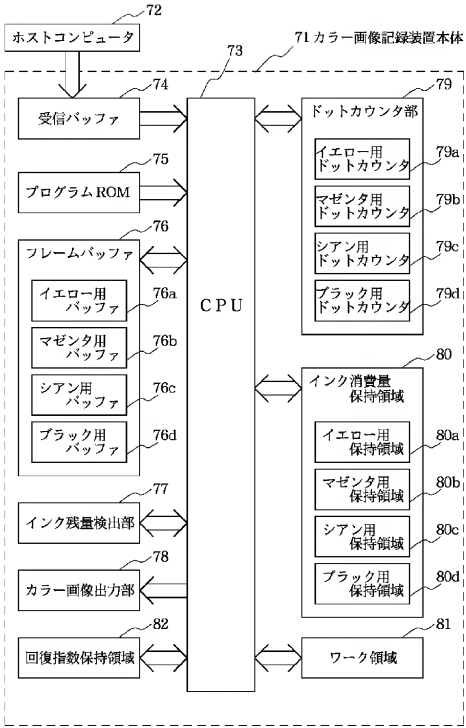
【図９】


52
ホストコンピュータ
51 カラー画像記録装置本体
53
54
受信バッファ
55
プログラムROM
56
フレームバッファ
イエロー用
バッファ
56a
マゼンタ用
バッファ
56b
シアン用
バッファ
56c
ブラック用
バッファ
56d
CPU
57
インク残量検出部
58
カラー画像出力部
62
メッセージ表示部
59
ドットカウンタ部
イエロー用
ドットカウンタ
59a
マゼンタ用
ドットカウンタ
59b
シアン用
ドットカウンタ
59c
ブラック用
ドットカウンタ
59d
60
インク消費量
保持領域
イエロー用
保持領域
60a
マゼンタ用
保持領域
60b
シアン用
保持領域
60c
ブラック用
保持領域
60d
61
ワーク領域

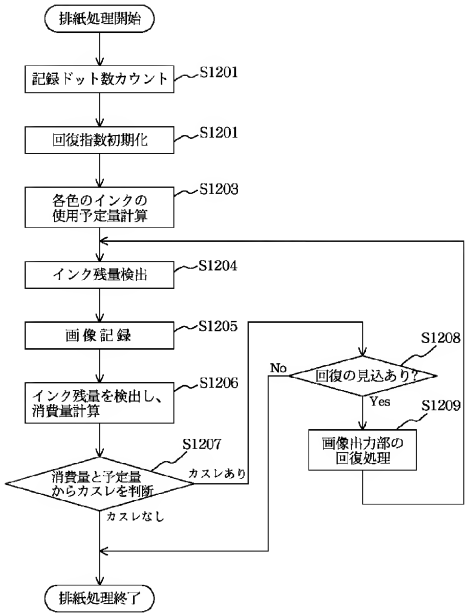
【図１０】


排紙処理開始
フレームバッファ内の
記録ドット数をカウントする
S1001
各色のインクの
使用予定量計算
S1002
インク残量検出
S1003
画像記録
S1004
インク残量を検出し、
消費量計算
S1005
S1006
消費量と予定量
からカスレを判断
カスレあり
カスレなし
警告メッセージ
を表示
S1007
排紙処理終了

【図１１】


72
ホストコンピュータ
71 カラー画像記録装置本体
73
74
受信バッファ
75
プログラムROM
76
フレームバッファ
イエロー用
バッファ
76a
マゼンタ用
バッファ
76b
シアン用
バッファ
76c
ブラック用
バッファ
76d
77
インク残量検出部
78
カラー画像出力部
82
回復指数保持領域
CPU
79
ドットカウンタ部
イエロー用
ドットカウンタ
79a
マゼンタ用
ドットカウンタ
79b
シアン用
ドットカウンタ
79c
ブラック用
ドットカウンタ
79d
80
インク消費量
保持領域
イエロー用
保持領域
80a
マゼンタ用
保持領域
80b
シアン用
保持領域
80c
ブラック用
保持領域
80d
81
ワーク領域

【図１２】


排紙処理開始
記録ドット数カウント
S1201
回復指数初期化
S1201
各色のインクの
使用予定量計算
S1203
インク残量検出
S1204
画像記録
S1205
インク残量を検出し、
消費量計算
S1206
消費量と予定量
からカスレを判断
S1207
カスレあり
カスレなし
No
回復の見込あり?
S1208
Yes
画像出力部の
回復処理
S1209
排紙処理終了